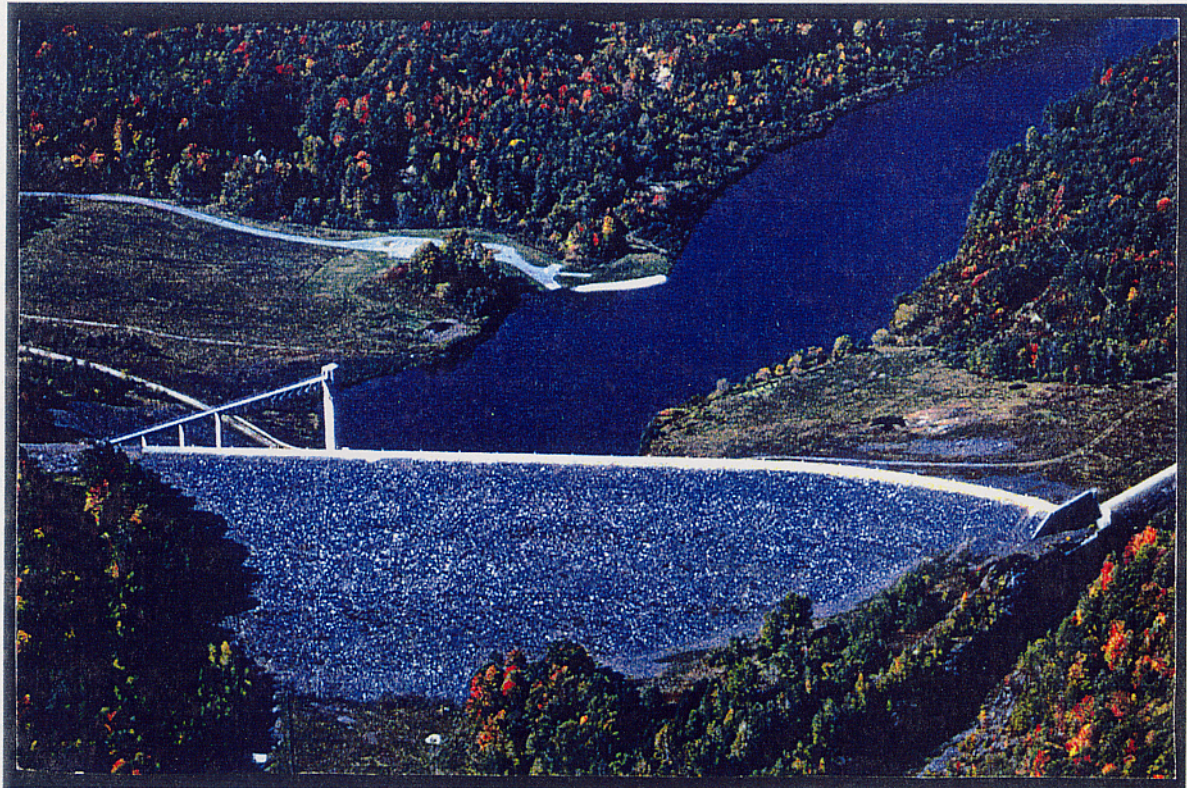
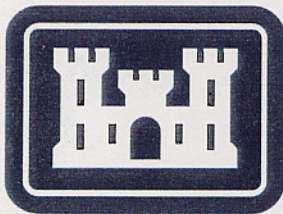

Master Plan

NORTH HARTLAND LAKE Hartland and Hartford Vermont



December 1999



U.S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751

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CENAE-EP-PP

23 December 1999
Heidebrecht/kab/78513

MEMORANDUM FOR Commander

SUBJECT: Submittal of Master Plan – North Hartland Lake, Hartland and Hartford, VT dated November 1999

1. In accordance with ER 1130-2-550 (15 November 1996), district commanders are responsible for approving master plans, supplements, and updates.
2. The subject Master Plan is enclosed for your review and approval. The previous Design Memorandum, Project Plan for Recreation Resources Development, North Hartland Lake, Hartland and Hartford, Vermont, dated 1981, is rescinded.
3. The Master Plan prescribes an overall land and water management plan, resource objectives, and associated design and management concepts that will provide the best combination of responses to regional needs, resource capabilities, and expressed public interest and desires consistent with the authorized flood control function of the North Hartland Lake project.
4. The plan has been prepared in cooperation with the Construction/Operations Division, which concurs with the Master Plan.

Encl


KENNETH E. HITCH, P.E.
Chief, Engineering/Planning Division

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Mr. Heidebrecht (doc:mpnhartlandlakememo)
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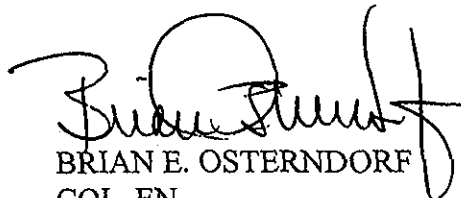
CENAE-EE 1st End

DATE: 29 DEC 1999

FOR Chief, Engineering/Planning Division

☒ Approved

☐ Disapproved


BRIAN E. OSTERNDORF
COL, EN
Commanding

MASTER PLAN NORTH HARTLAND LAKE

Hartland and Hartford, Vermont

Prepared for:

U. S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751

Prepared by:

ENSR
35 Nagog Park
Acton, MA 01720

December 1999

Executive Summary

This Master Plan covers 1,464 acres of federally owned land at North Hartland Lake. The Master Plan prescribes an overall land and water management plan, resource objectives, and associated design and management concepts which provide the best possible combination of responses to regional needs, resource capabilities and suitabilities, and expressed public interests and desires consistent with the project's authorized flood control purpose. The Master Plan covers all project resources, including but not limited to fish and wildlife, vegetation, cultural, aesthetic, interpretive, recreational, mineral, commercial and outgranted lands, easements and water.

Inputs to the planning process were surveys and management plans for natural, wetland and cultural resources, and an analysis of recreational use, capacity and projected needs for project lands. Natural and man-made resources were located, identified and analyzed, including wetlands, exemplary natural communities, and cultural resources that require specific management efforts for their protection. These were integrated into a series of project wide objectives to protect and enhance project resources and promote and develop, as appropriate, those resources for public use, education, and access.

Recreational opportunities were identified through an analysis of regional needs, and the public participation process. This planning process identified opportunities for the improvement of existing recreational facilities, enhancement of boat and beach facilities, picnic areas and play fields, and multiple resource management to enhance and protect important natural and cultural resources. Enhancing and preserving the resources by careful management of user conflicts were also identified.

The carrying capacity of the site is constrained by the size of the beach and the limitations on availability of picnic shelters and parking. A review of the recreational level of activity and demand did reveal the need for minimal expansion of the recreational facilities that should be addressed by park managers.

This Master Plan provides guidance for future development at North Hartland Lake. The natural and man-made resources at the project will continue to be managed to provide the best combination of responses to regional and ecosystem needs, project resources and capabilities. During the implementation phase period of the Master Plan, the New England District will continue to be responsible for the administration and management of the project's 1,464 acres.

All specific proposals for recreational or other development at the project must comply with this Master Plan, the Connecticut River Basin flood control requirements, and the National Environmental Policy Act and federal requirements.

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1.0 INTRODUCTION

1.1 PROJECT AUTHORIZATION AND PURPOSE

North Hartland Lake is located in the towns of Hartland and Hartford in south central Vermont on the Ottauquechee River in Windsor County. The USACE constructed the North Hartland Lake flood control project as one of many that were built by the USACE to reduce loss of life and property damage along the Connecticut River and its tributaries as part of the comprehensive plan for flood control in the Connecticut River Valley.

The North Hartland Lake project was authorized by the Flood Control Act of 1938 (Public Law 761, 75th Congress, 1st session), as amended by the Flood Control Act of 1941 (Public Law 228, 77th Congress, 1st Session), and supplemented by the Flood Control Compact adopted by the States of Connecticut, Massachusetts, New Hampshire, and Vermont in 1953 (Public Law 52, 83rd Congress).

Authorization for development and use of the reservoir area for public recreation and other purposes is contained in Section 4 of the Flood Control Act of December 22, 1944 (Public Law 534, 78th Congress, 2nd Session), as amended.

The dam, located on the Ottauquechee River 1.4 miles upstream of the confluence with the Connecticut River, regulates a drainage area of approximately 220 square miles. The project, in conjunction with other elements in the comprehensive plan for flood control and other purposes in the Connecticut River Basin, provides flood protection for downstream damage centers along the Connecticut River in Vermont, New Hampshire, Massachusetts and Connecticut (see Figure 1-1).

1.2 PURPOSE AND SCOPE OF THE MASTER PLAN

This master plan for management of natural resources and outdoor recreation has been prepared in accordance with the objectives and policies governing planning, development and management of these resources at Corps of Engineers water resource projects. These objectives and policies are outlined in ER 1130-2-540, "Environmental Stewardship Operation and Maintenance Policies"; ER 1130-2-550, "Recreation Operations and Maintenance Policies"; EP 1130-2-550, "Recreation Operations and Maintenance Guidance and Procedures"; ER 1165-2-400, "Recreational Planning, Development, and Management Policies", and other related or referenced regulations and policies.

ER 1130-2-540 established the following program objectives for management of a project's natural resources:

- Manage natural resources on Corps of Engineers administered land and water in accordance with ecosystem management principles to insure their continued availability.
- Provide a safe and healthful environment for project visitors.

Utilizing this general guidance, ER 1130-2-550 and EP 1130-2-550 provide the specific policy for preparation of project master plans. Each master plan must cover all resources, including but not limited to fish and wildlife, vegetation, cultural, aesthetic, interpretive, recreational, mineral, commercial and outgranted lands, easements, and water. Based on EP 1130-2-550, the primary goals of the North Hartland Lake Master Plan are to prepare a concept document that prescribes an overall land and water management plan, and establishes resource objectives, and associated design and management concepts, which:

- Provide the best combination of responses to regional needs, resource capabilities and suitabilities, and expressed public desires consistent with authorized project purposes;
- Contribute towards providing a high degree of recreational diversity within the region;
- Emphasize the particular qualities, characteristics and potentials of the project;
- Exhibit consistency and compatibility with national objectives and other state and regional goals and programs.

ER 1130-2-550 further defines these goals as they relate to recreation management and established the following program objectives:

- Provide a quality outdoor recreation experience that includes an accessible, safe and healthful environment for a diverse population,
- Increase the level of self-sufficiency for the Corps recreation program, and
- Provide outdoor recreation opportunities on Corps of Engineers administered land and water on a sustained basis.

1.3 PLANNING PROCESS

An interdisciplinary study team consisting of staff from the U.S. Army Corps of Engineers, New England District (NAE Engineering/Planning Division and Construction/Operations Division) and ENSR, Inc., working as a contractor to the NAE staff, developed the majority of information contained in the Master Plan. The team included personnel with expertise in the following disciplines:

1. Planning and engineering
2. Natural resources management
3. Wetland science
4. Wildlife biology
5. Geographic Information Systems (GIS)
6. Archaeological and cultural resources
7. Forestry
8. Landscape architecture

Major inputs to the planning process included natural, cultural, and recreational resource inventories and analysis, projections of future needs, and public desires for use of project lands. This information was integrated into project-wide objectives and goals to provide the best use of the federally owned land at North Hartland Lake.

Public input was obtained through public notices, coordination with state, regional and local officials, and public workshop meetings held in Hartland and Hartford, Vermont. Objectives of this public coordination process were:

1. Identify and address concerns
2. Solicit and discuss management needs and ideas
3. Present preliminary study results
4. Receive input and public review of the draft Master Plan.

The Master Plan is a policy document that serves as an overall management guide for the project while specific management actions are included in the Operational Management Plan (OMP). For consistency with the Master Plan, the existing OMP, dated 1995, will be revised to describe, in detail, how the objectives and concepts of the Master Plan will be achieved.

1.4 RE-EVALUATION OF THE MASTER PLAN

The Master Plan is a flexible-planning document that will be periodically reevaluated to be kept current. It will be reviewed on a periodic basis and will be revised as required. The District Engineer will approve supplements and revisions to the Master Plan.

1.5 APPLICATION OF FEDERAL LAWS

The following laws, implementing regulations and administrative orders are applicable to the development and management of the North Hartland Lake project.

1. Public Law 75-761 (Flood Control Act of 1938), as amended by Public Law 77-228 (Flood Control Act of 1941), and supplemented by Public Law 83-52 Flood Control Compact Act of 1953, which authorized land acquisition, construction and operation of this project.
2. Historic Sites, Buildings and Antiquities Act of 1935 (16 U.S.C. 461-467). Known as the Historic Sites Act, this Act declared it a national policy to preserve historic sites and objects of national significance, including those located on refuges. It provides for designation, acquisition, administration and protection of such sites. Additionally, National Historic Landmarks are designated under authority of this Act.
3. Public Law 78-534 (The Flood Control Act of 1944), as amended by the Flood Control Acts of 1946, 1954, 1960 and 1962, authorizes the Corps of Engineers to construct, operate and maintain public park and recreation facilities at water resource development projects, and to permit local interests to construct, operate and maintain such facilities.
4. Public Law 85-624 (The Fish and Wildlife Coordination Act) requires that the Corps of Engineers and any agency impounding, diverting, or controlling water, consult with the United States Department of the Interior, Fish and Wildlife Service. The Department of the Interior would evaluate proposed water resources development measures, and determine potential impacts to wildlife resources and measures needed to prevent such impacts.
5. Reservoir Salvage Act of 1960 (16 U.S.C. 469-469c). This Act is also known as the Archaeological and Historic Data Preservation Act, Archaeological and Historic Preservation Act, "Moss-Bennett Act", and the Archaeological Recovery Act. When enacted in 1960, this law simply authorized the Secretary to the Interior to conduct salvage archaeology in advance of dam and reservoir construction by the Corps of Engineers and other agencies. In 1974, it was amended comprehensively to authorize salvage in connection with all kinds of federal, federally assisted,

and federally licensed projects. As amended, it also directs federal agencies to cooperate with the Department of the Interior in conducting salvage, or to fund such work themselves, and to report to Interior on archaeological programs and any disturbance of archaeological sites.

6. Public Law 86-717 (Forest Cover Act, 6 September 1960) provides a statutory mandate for multiple use forest management, or other vegetative cover management, on project lands and waters.
7. Public Law 89-72 (The Federal Water Project Recreation Act of 1965), accompanied by House Committee Report No. 254, requires that the Corps of Engineers and other federal agencies give full consideration to fish and wildlife enhancement. It also provides for non-federal participation in land acquisition, and in the development and management of recreational facilities and fish and wildlife resources.
8. Public Law 89-665 (The National Historic Preservation Act of 1966), as amended in 1992, directs the Corps of Engineers and other federal agencies to provide leadership in preserving, restoring and maintaining the historic and cultural environment of the nation.
9. Public Law 91-190 (The National Environmental Policy Act of 1969), directs the Corps of Engineers and other federal agencies to prepare environmental impact statements or assessments that describe the environmental effects of proposed projects and measures necessary to minimize any adverse effects.
10. Public Law 91-604 (The Clean Air Act, as amended), specifies that any federal activity, which may result in discharge of air pollutants, comply with federal, state, interstate, and local requirements concerning control and abatement of air pollution.
11. Public Law 93-205 (The Endangered Species Act of 1973, as amended), requires federal agencies to utilize their authorities to carry out programs for conservation of endangered and threatened species protected by the Act.
12. Executive Order 11988 (Floodplain Management, 24 May 1977) requires that the Corps of Engineers and other federal agencies prevent avoidable adverse effects or incompatible developments in floodplains by assessing proposed actions, considering alternative approaches when adverse effects would result, and formulating designs and project modifications to minimize impacts.
13. Executive Order 13045 (Protection of Children From Environmental Health Risks and Safety Risks, 21 April 1997), seeks to protect children from disproportionately incurring environmental health or safety risks that might arise as a result of Army policies, programs, activities and

standards. Environmental health risks and safety risks include risks to health and safety attributable to products or substances with which a child is likely to come in contact or ingest.

14. Executive Order 11990 (Protection of Wetlands, 24 May 1977) requires that all federal agencies take action to *minimize destruction, loss or degradation of wetlands*. It stipulates that federal agencies must avoid providing assistance for new construction located in wetlands unless practicable alternatives exist, and the proposed action includes measures to minimize harm to wetlands.
15. Public Law 95-217 (Clean Water Act of 1977, as amended). Section 404 imposes requirements with respect to dredge and fill activities in waterways of the United States, including wetlands. Any fill activities in wetlands, must comply with Section 404(b)(1), *Guidelines for the Specification of Disposal Sites for Dredge or Fill Material*. These guidelines allow fill activities for only the least environmentally damaging practical alternative.
16. Public Law 95-341 (American Indian Religious Freedom Act of 1978 - AIRFA). This Act formalizes a policy whereby federal agencies will preserve the inherent right of American Indians to express and exercise their traditional religion. These rights include access to sites (which may be on federal lands), use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites. The Act requires agencies to consult with Native American groups, but agencies need not accede to Native American requests.
17. Public Law 96-95 (Archaeological Resources Protection Act of 1979 - ARPA). This statute provides protection for archaeological resources by requiring any interested parties to apply for a permit from the controlling federal agency to excavate, or remove any archaeological resource located on public or Indian lands. The Act also provides for civil and criminal penalties for individuals disturbing or looting sites (including military personnel that allow such actions).
18. Public Law 101-601 (Native American Graves Protection and Repatriation Act of 1990--NAGPRA). This act requires agencies to inventory and repatriate certain Native American cultural items recovered from federal property to associated Native American groups. These items include *human remains, associated funerary objects, sacred objects, and objects of cultural patrimony*. The Act describes in detail the items included in these classifications and the procedure for repatriation. The Act also provides for the inadvertent discovery of Native remains and objects. If *discovery is related to an activity on federal land such as construction, logging, agriculture, or other, such activity must cease until proper notification is conducted*.
19. National Register of Historic Places, Nominations by States and Federal Agencies (36 CFR 60). These regulations govern the process whereby state and federal agencies nominate specific resources under their control to the National Register of Historic Places. This is the country's

basic inventory of historic resources and it is maintained by the Secretary of the Interior. This inventory includes buildings, structures, objects, sites, districts, and archaeological resources that may be significant at the national, state or local level.

20. Advisory Council on Historic Preservation, Protection of Historic Properties (36 CFR 800). These are the implementing regulations, which govern the Section 106 review process established by the National Historic Preservation Act of 1966, as amended for federal agencies. These regulations implement procedures for assessing the effects of federally approved, assisted, or funded undertakings on properties, which are, or may be, eligible for listing on the National Register of Historic Places.
21. Public Law 89-80 (Water Resources Act) authorizes the establishment of the U.S. Water Resources Council, which has authority to set forth planning standards and water quality criteria and to maintain a continuing study of regional or river basin plans and programs in relation to national water resource requirements.
22. Executive Order 12088 (Federal Facilities Compliance with Pollution Control Standards, 1978) delegates responsibility to the head of each federal agency for ensuring that all necessary actions are taken for the prevention, control, and abatement of environmental pollution. This order gives the Environmental Protection Agency authority to conduct reviews and inspections to monitor federal facility compliance with pollution control standards.
23. Army Regulation 200-1 (Environmental Protection and Enhancement) prescribes Department of the Army responsibilities, policies, and procedures to preserve, protect, and restore the quality of the environment. It incorporates all applicable statutory and regulatory requirements in the areas of research and development; water resources management; air pollution abatement; hazardous materials management; solid and hazardous waste management; noise abatement; oil and hazardous substances spill contingency planning, control, and emergency response; environmental restoration; asbestos management; radon reduction; and other environmental programs.
24. Public Law 93-523 (Safe Drinking Water Act of 1974) establishes a federal program to monitor and increase the safety of all commercially and publicly supplied drinking water. All federal agencies must comply with the standards established in this law as amended.
25. Public Law 94-580 (The Resource Conservation and Recovery Act of 1976), an amendment to the Solid Waste Disposal Act, authorizes EPA to provide for "cradle-to-grave" management of hazardous waste. Under RCRA, hazardous waste is controlled from generation to disposal through tracking and permitting systems, and restrictions and controls on the placement of waste on or into the land.

26. Public Law 101-336, as amended by Public Law 104-59 (The Americans with Disabilities Act) prohibits discrimination of individuals based on disability. It requires public transportation services and public buildings to be accessible to individuals with disabilities and prohibits discrimination in employment of qualified individuals with disabilities.
27. Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, 11 February 1994) requires federal agencies to examine proposed actions to determine whether they will have disproportionately high and adverse human health or environmental effects on minority or low income populations.
28. Public Law 97-89 (the Farmland Protection Policy Act) was enacted to minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmland to non-agricultural uses.

1.6 U.S. ARMY CORPS OF ENGINEERS GUIDANCE

The Master Plan has been prepared in accordance with guidance contained in the following Corps regulations, pamphlets, and manual:

ER 1130-2-500	Project Operations, Partners and Support, Work Management Policies
ER 1130-2-540	Environmental Stewardship, Operations and Maintenance Policies
EP 1130-2-550	Recreation, Operations and Maintenance Policies
ER 1165-2-400	Recreation Planning, Development and Management Policies
ER 1130-2-500	Project Operations, Partners and Support, Work Management Guidance and Procedures
EP 1130-2-540	Environmental Stewardship, Operations and Maintenance Guidance and Procedures
EP 1130-2-550	Recreation, Operations and Maintenance Guidance and Procedures
EM 1110-1-400	Recreation Planning and Design Criteria

1.7 PRIOR PERTINENT REPORTS

The following design memoranda prepared by the New England District, Corps of Engineers, provided basic data concerning the project.

<u>Memorandum No.</u>	<u>Title</u>	<u>Date</u>
1	Hydrology and Meteorology	August 1956
2	General Design	August 1956
3	Relocations	April 1959
4	Real Estate	November 1958
	Preliminary Part 1	September 1956
5	Canceled	
6	Geology and Materials	April 1957
7	Embankment Design	June 1957
	Addendum A	November 1957
8	Outlet Works, Spillway and	
	Diversion Plan	June 1957
9	Master Plan for Reservoir	
	Development	March 1962
10	Building and Grounds	July 1957

Other reports that were reviewed and evaluated as part of this master planning effort include the following:

- "Vermont Recreation Plan: Assessment and Policy", 1993, prepared by the Vermont Agency of Natural Resources, Waterbury, Vermont.
- "Vermont Recreation Plan: Natural, Cultural, Human & Recreational Resources", 1993, prepared by the Vermont Agency of Natural Resources, Waterbury, Vermont.
- "Quechee Gorge Public Lands Highways Study, Master Plan", 1996, prepared for the state of Vermont Agency of Transportation & Upper Valley Lake Sunapee Regional Planning Commission; Hartford, Vermont [Project #PLH QGSP (1)].
- "Rare Plants and Animals and Significant Natural Communities at North Hartland Lake, Hartland and Hartford, Windsor County, Vermont", 1996, prepared by the Vermont Nongame and Natural Heritage Program (Waterbury, Vermont) for the U.S. Army Corps of Engineers, New England District; Concord, Massachusetts.

- "Project Plan for Recreation Resources Development, North Hartland Lake, Hartland and Hartford, Vermont", 1981, prepared by the U.S. Army Corps of Engineers, New England District, Concord, Massachusetts.
- "Final Environmental Statement for North Hartland Lake, Ottauquechee River, Hartland and Hartford, Vermont", 1977, prepared by the U.S. Army Corps of Engineers, New England District, Concord, Massachusetts.
- "Recreational Carrying Capacity and Application to Lake Management", 1989, prepared by the U.S. Army Corps of Engineers, New England District, Concord, Massachusetts.
- Thomas, Peter A. and Bourassa, Marie Lynn. March 1986. "Cultural Resource Management Study - North Hartland Lake, Hartland and Hartford, Vermont". Submitted to Sanford Ecological Services, Inc. and Department of the Army, U.S. Army Corps of Engineers, New England District, Concord, Massachusetts, by the Department of Anthropology, University of Vermont.
- U.S. Army Corps of Engineers, Department of the Army, Washington, D.C. November 15, 1996. "Recreation Operations and Maintenance Policies". Regulation No. 1130-2-550, ER 1130-2-550.
- U.S. Army Corps of Engineers, Department of the Army, Washington, D.C. November 15, 1996. "Recreation Operations and Maintenance Guidance and Procedures". Pamphlet No. 1130-2-550, EP 1130-2-550.
- U.S. Army Corps of Engineers, Department of the Army, Washington, D.C. November 15, 1996. "Environmental Stewardship Operations and Maintenance Policies". Regulation No. 1130-2-540, ER 1130-2-540.
- U.S. Army Corps of Engineers, Department of the Army, Washington, D.C. November 15, 1996. "Environmental Stewardship Operations and Maintenance Guidance and Procedures". Pamphlet No. 1130-2-540, EP 1130-2-540.
- U.S. Army Corps of Engineers, New England District, Concord, Massachusetts. September 1996. "Solid Waste Management Plan - North Hartland Lake, Vermont, Flood Control Project, Connecticut River Basis Ottauquechee River Watershed".
- U.S. Army Corps of Engineers, New England District, Concord, Massachusetts. November 1995. "Water Resources Development - North Hartland Lake, Vermont". The Work of the U.S. Army Corps of Engineers in Vermont.

- Vermont Cooperative Soil Survey Available Information. July, 1997.
- "Operational Management Plan, North Hartland Lake", 26 May 1995, prepared by the U.S. Army Corps of Engineers, New England Division, Waltham, Massachusetts.
- U.S. Army Corps of Engineers, New England District, Concord, Massachusetts. March 1999. "North Hartland 'Lakewatch' Investigation: A Survey of the Fisheries and Water Quality conducted in August 1998 at North Hartland Lake, North Hartland, Vermont."

2.0 PROJECT DESCRIPTION

2.1 LOCATION

The North Hartland Lake site is located on the Ottauquechee River in the townships of Hartland and Hartford, Windsor County, Vermont (Figure 2-1). The Ottauquechee River, which originates in Rutland County, has a drainage area of about 220 square miles. From its origin, the river flows in a generally southerly direction to its confluence with the Connecticut River just south of White River Junction, Vermont. The dam and dike are in Hartland and the impoundment areas are situated in the towns of Hartland and Hartford. The dam for this flood control project lies approximately 1.4 miles upstream of the confluence of the Ottauquechee and Connecticut Rivers.

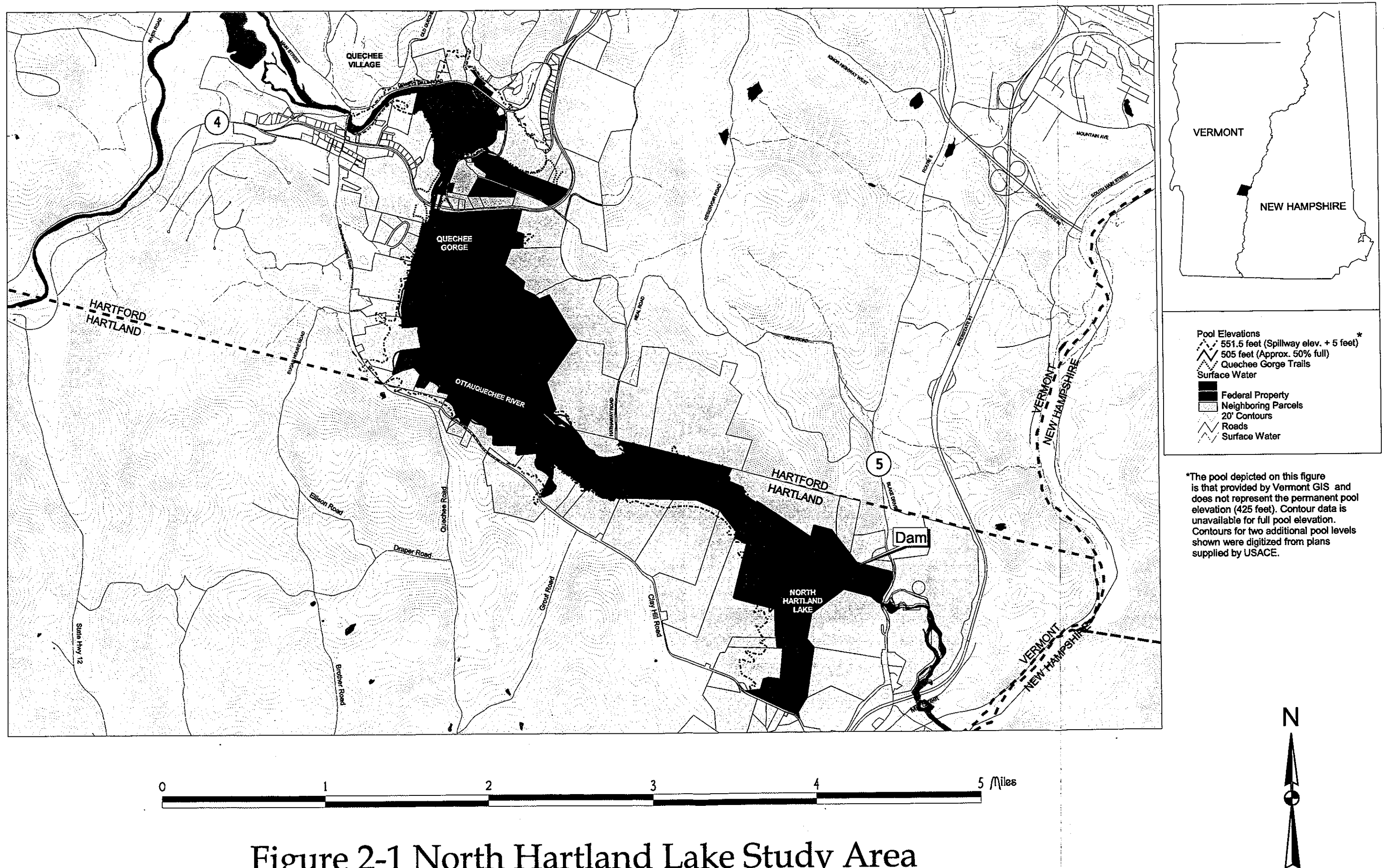
2.2 PROJECT DATA

The project consists of a rolled earthfill dam with stone slope protection 1,640 feet long and 185 feet high; a 743-foot-long gated concrete horseshoe conduit under the dam with a diameter of 14 feet 4 inches; a 2,110-foot-long dike with stone slope protection having a maximum height of 52 feet; a 476-foot-long gated concrete circular conduit under the dike with a diameter of three feet; and an L-shaped spillway cut in rock with a 465-foot-long ogee weir. The weir's crest elevation is 25.5 feet lower than the top of the dam. After discharging, the flows are returned through the 1,400-foot long channel back to the Ottauquechee River.

North Hartland Lake has a permanent pool of 215 acres at 425 feet (NGVD), with a depth of 35 feet. The flood storage of the project totals 1,110 acres and extends 5.5 miles upstream through Hartford. Construction of the project was initiated in June 1958 and the project was completed in 1961 at a total cost of \$7,312,200. Through August 1998, the facility has prevented approximately \$80,463,000 in flood damage. Additional pertinent data concerning the project is contained in Table 2-1.

2.3 REAL ESTATE AND LAND USE

All lands at North Hartland Lake were acquired for flood control operations. This included areas for the permanent structures, including the dam facility, reservoir, borrow areas, buildings and roadways. The federal government purchased 1,464 acres along the Ottauquechee River and obtained flowage easement rights to additional 248 acres for a total of 1,712 acres (see Figure 2-2). The recreation pool covers 215 acres at 425 feet NGVD. Land area available for terrestrial management totals about 1,075 acres with approximately 800 acres forested.



*The pool depicted on this figure is that provided by Vermont GIS and does not represent the permanent pool elevation (425 feet). Contour data is unavailable for full pool elevation. Contours for two additional pool levels shown were digitized from plans supplied by USACE.

**Table 2-1
Pertinent Data
North Hartland Lake**

Location:	The damsite is on the Ottauquechee River, 1.4 miles above its junction with the Connecticut River and 1 mile northwest of North Hartland, Vermont. The project lies within the towns of Hartland and Hartford, in Windsor County, Vermont		
Drainage Area:	220 square miles		
Purpose	The reservoir is operated primarily as a unit of a coordinated system of reservoirs for flood control in the Connecticut River Basin. Although not specifically authorized, recreational facilities are also provided. Non-Federal hydropower facilities are located near Dewey's Pond and downstream of the North Hartland Dam.		
Reservoir Storage: Operating Levels:			
	Pool	Elevation (NGVD)	Area (acres) Capacity (acre-feet)
	Invert	390	---
	Permanent	425	215 3,050
	Flood Control (Spillway Crest)	546.5	1,100 71,800
Dam:			
Type:	Rolled earth and rockfill		
Maximum Height (ft):	185		
Length (ft):	1,640		
Top Elevation (NGVD):	572.0		
Dike:			
Type:	Rolled earth and rockfill		
Length (ft):	2,110		
Maximum Height (ft):	52		
Top Elevation (NGVD):	Varies from 572.0 - 574.0		
Spillway:			
Location:	Left bank		
Type:	L-shaped side channel spillway with ogee weir		
Crest Length (ft):	465		
Crest Elevation (NGVD):	546.5		
Maximum Discharge Capacity (NGVD):	160,900		
Outlet Works:	DAM	DIKE	
Type:	Horseshoe conduit	Circular	
Size:	14' 4" diameter	36" diameter	
Length (ft):	743	476	
Gates:	(3) 5'8" width x 10' vertical height	(1) 3' x 3' vertical sluice	
Discharge at Spillway Crest (cfs):	169,000		
Stilling Basin:	none		
Land Acquisition:			
Fee (acres):	1,464		
Easement (acres):	248		
Cost of Construction:			
Federal:			
construction:	\$6,349,200		
lands and damages:	\$963,000		
Non-Federal:	\$0.00		
TOTAL:	\$7,312,200		
Reservoir Management:	Reservoir management has proceeded in accordance with the basic project document; Design Memorandum Number 10, Supplement A, Master Plan for Reservoir Development, dated February 1968. The overall project is maintained by the New England District Corps of Engineers.		

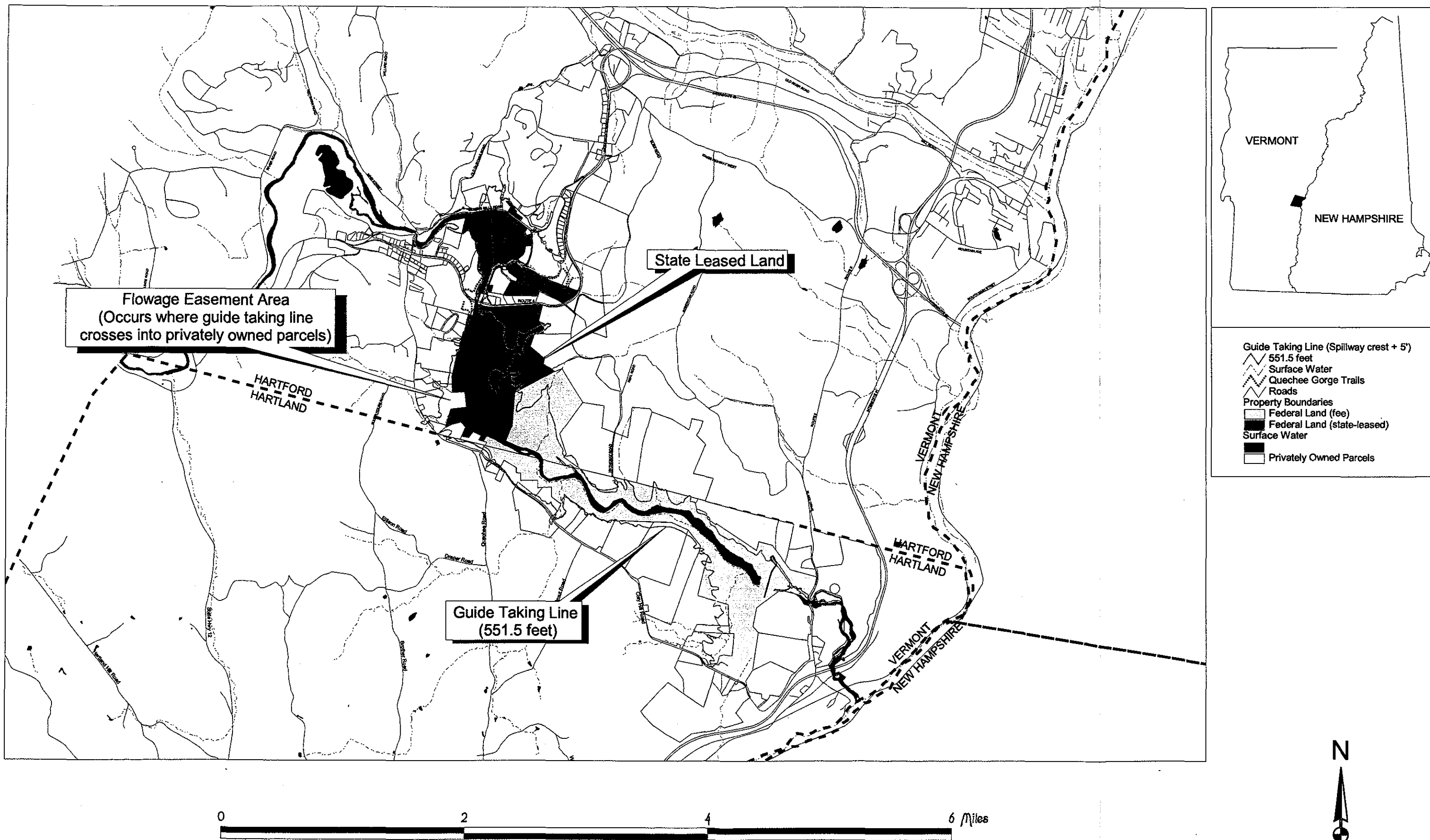


Figure 2-2 Property Boundaries

The project lands were acquired for flood control and their primary purpose continues to be flood control. Therefore, all lands at the project are allocated as operations under the land use allocation and classification system.

The state of Vermont, Department of Forest Parks and Recreation, leases and manages a portion of the project area (612 acres) located in the upstream end of the reservoir. The leased area includes Quechee State Park, and other natural areas used for forest and wildlife management purposes.

Land uses adjacent to the project area are primarily forest/residential/agriculture with commercial development found along U.S. Route 4 near Quechee Gorge.

2.4 RELATIONSHIP OF THE PROJECT TO OTHER PROJECTS AND PROGRAMS

As one of 16 flood control dams in the comprehensive Connecticut River basin system, North Hartland Lake reduces flood stages along the Connecticut River. Other active flood control projects in the Upper Connecticut River basin include Ball Mountain Lake, Townshend Lake, Union Village Dam, Otter Brook Lake, Surry Mountain Lake and North Springfield Lake. On July 27, 1998, President Clinton declared the Connecticut River an American Heritage River.

During flood periods, the Reservoir Control Center (RCC) at New England District headquarters in Concord, Massachusetts coordinates operation of the 16 Connecticut River Basin projects. The North Hartland dam's operation is coordinated with the other reservoirs by the RCC to achieve the maximum reduction in flood stages and damages in the Connecticut River basin. Regulation is initiated as a result of heavy rainfall over the Ottauquechee River watershed and also for specific river stages at key locations along the Ottauquechee and Connecticut rivers. Reservoir regulation is normally conducted in three phases. Phase I involves the initial appraisal of storm and river conditions that leads to regulation of flows; Phase II concerns regulation during the event as floodflows crest and move downstream; and Phase III includes emptying of the reservoir following recession of the flood. For the purpose of minimizing downstream impacts to riverine resources, scheduled gate changes are coordinated in advance with the Vermont Agency of Natural Resources (VTANR).

Routine project operation and maintenance will be addressed in an Environmental Assessment that is currently under development. Personnel at North Hartland Lake are also responsible for operation and maintenance activities at Union Village Dam. Resources for daily management of the Union Village Dam are shared with North Hartland Lake.

The U.S. Army Corps of Engineers provides outgrants for certain activities, such as information booths. Two non-federal hydroelectric power facilities are located along the Ottauquechee River within the project area. Consolidated Hydro, Inc. (CHI) operates a facility near Dewey's Mill Pond. It produces 1.4 megawatts of power and is operating at 95-98% of the time (see Appendix B, Photo No. 10).

2.4.1 Vermont State Comprehensive Outdoor Recreation Plan (SCORP, 1993)

According to the SCORP, tourism is recognized as a major industry in the state of Vermont. A statewide survey revealed visitors and tourists have a positive impact on various aspects of life in Vermont, including jobs, cultural activities, shopping and recreation. (SCORP, 1993). On the other hand, it is perceived that along with the tourist trade come the negative effects of traffic congestion and higher land and housing costs.

The Upper Valley Lake Sunapee Regional Planning Commission (UVLSRPC), which represents 32 Towns in Windsor and Grafton Counties, including Hartford and Hartland, provided the following information regarding recreational issues and needs.

The major concerns and issues of the local communities within this 20-mile radius of the project area include:

- Conservation of the existing natural, cultural and scenic resources
- Inadequacy of recreational opportunities
- Limited access to private lands

The priorities identified for outdoor recreation as noted in this state-wide Plan are as follows:

- More recreational corridors to accommodate trail users including, hiking, bicycling, snowmobiling, cross-country skiing, and horseback riding
- Additional picnic areas
- Additional beaches
- Additional public lands for recreation
- Low priority was given for tennis, camping, sail boarding and sailing.

2.4.2 Hartford Master Plan (1998)

The Town of Hartford, Vermont recently completed a Master Plan (1998) which identified recreational needs and recommendations for expanded and improved facilities. The recommendations that are pertinent to the North Hartland Lake plan

- Plan transportation paths and corridors for hiking and biking along the Connecticut River
- Encourage future development to connect parks and private lands with hike/bike trails
- Acquire additional lands for public parks and trails, particularly in Quechee and Hartford villages.

2.4.3 Quechee Gorge Public Lands Highways Study (1996)

The Vermont Agency of Transportation and the Upper Valley Lake Sunapee Regional Planning Commission recently completed a study of the U.S. Route 4 Corridor and the Quechee Gorge area to address transportation, safety and visitor experience issues. A steering committee composed of federal, state and local officials, landowners, and interest group representatives prepared a concept plan with the following goals:

- To improve and enhance vehicular, pedestrian and bicycle circulation and safety
- Improve and enhance visitor amenities
- Improve signage
- Improve and enhance trails
- Diversify environmentally compatible outdoor recreation opportunities
- Ensure environmental resource protection
- Provide for appropriate type and scale of commercial development.

2.5 SIGNIFICANT FLOOD CONTROL STORAGES

The permanent pool stage of 35 feet is maintained throughout the year under normal operating conditions. A pool stage of 50 feet represents storage utilizing about 6 percent of the 71,000 acre-feet of total flood control storage available at spillway crest elevation 546.5 feet NGVD. Since its construction in 1961, the pool stage has exceeded six percent on 46 occasions and 38 percent on five occasions. The most significant storage as of 1998 is at pool elevation 135.8 feet. This represents 70 percent of the available flood storage capacity. Table 2-2 provides a summary of significant storages for North Hartland Lake between 1961 and 1998. The storage data is listed by the maximum storage limits reached.

2.6 HISTORIC CONTEXT

2.6.1 Prehistoric Period

The Cultural Resource Management Study prepared by Thomas and Bourassa for the University of Vermont identified one prehistoric site (VT-WN-57) along the Ottauquechee River within the project area (UVM, 1986).

Table 2-2
 Storages
 North Hartland Lake
 (1961-1998)

Date	Significant Pool Level (ft)	Storage Utilized		
		Inches	Acres/Feet	Percent
1987 Apr	135.8	4.1	48600	70
1969 Apr	129	3.7	43180	62
1984 Jun	118.9	3.1	36360	52
1973 Jul	113.8	2.8	33140	48
1998 Apr	105.6	2.65	28308	38
1993 Apr	97.7	2	23990	34
1977 Mar	90.5	1.7	20260	29
1976 Apr	84.1	1.5	17230	25
1979 Mar	84.1	1.5	17230	25
1994 Apr	78.8	1.3	14780	21
1996 Jan	78.4	1.2	14610	21
1972 May	78	1.2	14440	20
1981 Feb	77.6	1.2	14270	20
1976 Aug	74.5	1.1	12940	18
1967 Apr	70.8	1	11340	16
1983 Apr	69.4	0.9	10770	15
1990 Mar	67.1	0.8	9900	14
1962 Apr	67	0.8	9860	14
1973 Mar	65.9	1.2	9440	13
1983 Dec	65.1	0.8	9140	13
1984 Mar	64.4	0.8	8870	12
1968 Apr	64.3	0.8	8830	12
1989 Oct	64.3	0.8	8830	12
1983 Mar	63.9	0.7	8680	12
1992 Mar	63.9	0.7	8680	12
1980 Apr	63.5	0.7	8520	12
1988 Apr	62.9	0.7	8290	12
1964 Mar	60.8	0.6	7480	10
1986 Mar	60.7	0.6	7440	10
1987 Oct	59.4	0.6	6980	10
1982 Apr	59	0.6	6850	9
1989 Apr	58.9	0.6	6810	9
1998 Jun	58.3	0.8	6614	9
1970 Apr	57	5	6190	8
1964 Apr	56.8	0.5	6120	8
1996 Oct	56.1	0.5	5890	8
1962 Apr	56	0.5	5860	8
1979 May	54.5	0.5	5400	7
1995 Nov	54.3	0.5	5350	7
1996 May	53.3	0.4	5100	7
1984 Dec	52.9	0.4	5000	7
1998 Jan	52.3	0.65	4850	6
1996 Apr	52.1	0.4	4800	6
1973 Dec	51.3	0.4	4600	6
1995 Jan	51	0.4	4530	6
1972 Apr	50.8	0.4	4480	6
1975 Oct	50.8	0.4	4480	6
1996 Nov	50.6	0.4	4420	6
1991 Apr	50.3	0.4	4350	6

* Pool above 50 ft. 6% storage DA = 220 sq. mi.
 1" Runoff = 11,733 acre-feet Zero stage = 390 ft. NGVD

The project is situated within a region where other sites have been identified. Early Archaic sites (9,500 to 7,800 B.P.) have been located approximately 20 miles upstream from the mouth of the Missisquoi River, 15 miles upstream from the mouth of the Lamoille River, 25 miles upstream from the mouth of the Winooski River 35 miles upstream into Otter Creek in Western Vermont (UVM), based on the discovery of projectile points.

From approximately 2800 B.P. and 1900 B.P. (the Early Woodland Period) foraging bands tended to remain in the lowlands where food was more plentiful. By the 1400 - 1200 B.P. extensive settlements were identified in the lower reaches of all the major river courses in the Champlain Basin (Thomas and Robinson 1979).

In summary, the dynamic climatic and resource conditions required the human populations from 12,000 to 300 years ago to move from upland areas to lowland along the entire Connecticut River basin.

2.6.2 Historic Period

The study of historic archeology in the Connecticut River basin is difficult since very little comparative data exists. A survey of projects reveals that 27 individual sites were evaluated and 16 went through a Phase I and II cultural resource management study.

The individual sites were focused on military activities from the French and Indian War, the American Revolution and the War of 1812. One project involved a National Register District evaluation of state-owned property at Chimney point, which encompassed an English fort (ca. 1690), a French fort (ca 1740), two revolutionary war vintage residences, a later residence, a store (ca. 1823), and two ferry landings (UVM, 1986).

Five of the individual sites were classified as craft/commercial sites and three as 19th century industrial sites. One of these sites, excavated by UVM archeologists, was an 18th century settler's cabin located in West Rutland, Vermont. One of the residential sites was excavated because it was believed to have been occupied briefly by Ethan Allen.

In general, historic archeology in New England has centered on the individual or unusual sites and structures, dating back specifically to the Colonial period (17th and 18th Century).

2.7 CLIMATE

The project area climate is variable and characterized by frequent but generally short periods of heavy precipitation during the summer months, and longer periods of less intense precipitation during the winter months. Winters are moderately severe with below 0°F temperatures common. Summers are mild with temperatures rising to 100°F only occasionally. North Hartland Lake lies within the path of the prevailing westerly winds and is exposed to cyclonic storms from the west or southwest, coastal storms that travel up the Atlantic seaboard (either tropical hurricanes or extra-tropical storms referred to locally as *Noreasters*), and thunderstorms of local origin or of the frontal type. Precipitation is fairly well distributed over a given year. Mean annual precipitation is approximately 39 inches, while mean annual snowfall is 88 inches (USACE, 1995).

2.8 TOPOGRAPHY

The topography of North Hartland Lake is highly varied. Elevation ranges from approximately 425 feet NGVD at the normal pool elevation of the lake, to up to 800 feet NGVD along the ridges north and east of the river and at the project limits (see Figure 2-1). Slope ranges from near vertical shale walls at Quechee Gorge (Photo 5, Appendix B), to gently rolling fields within the floodplains of the Ottauquechee River.

The Ottauquechee River has a main stream length of 38 miles and drains an area of 220 square miles in east central Vermont. The watershed is extremely narrow and the surrounding terrain is characterized by steep topography that is conducive to rapid runoff. The elevation at the perimeter of the basin varies from 4,240 feet NGVD in the western headwaters to 1,000 feet NGVD in the eastern portion. The Ottauquechee River has a fall of approximately 420 feet per mile for the first 2.5 miles; in the next 5 miles the river drops about 100 feet; in the remaining 30 miles the drop is about 300 feet. Most of its tributaries are swift mountain streams.

2.9 PROJECT ACCESS

The entrance to North Hartland Lake is located on Clay Hill Road approximately one mile west of U.S. Route 5. The access road runs along the top of the earthen dike that leads into the North Hartland Lake area and the public recreation area. The park has 1.5 miles of bituminous asphalt roadways. All roads within the park are gated.

An entrance sign is situated along the northerly side of the access road that identifies North Hartland Lake and the Dam facility. Local residents that are aware of the public recreation area and those that are

directed to the facility by the Quechee Chamber of Commerce are the primary users of the beach and picnic facilities. The Chamber operates a small information booth on U.S. Route 4 near Quechee State Park.

The bridge across Quechee Gorge affords one of the most spectacular views of Quechee Gorge and distant views of the river valley. The bridge has a 30-foot wide road surface used by vehicles and bicycles. On either side of the road are two 4'2" pedestrian sidewalks that are used extensively by visitors to view the gorge. While the bridge adequately handles the vehicular traffic, the sidewalks present safety and circulation problems.

3.0 RESOURCE INVENTORY AND ANALYSIS

3.1 INTRODUCTION

The environmental resources of the North Hartland Lake project provide valuable natural resource and recreational opportunities. The project maintains a wide variety of fish and wildlife resources, and provides popular recreational facilities for the surrounding communities, as well as transient visitors to the Quechee Gorge area. Fish, wildlife, and forestry management and enhancement programs are carried out on project lands. *Recreational activities include swimming, boating, hiking, hunting, fishing, picnicking, camping, and natural history education through an established interpretive trail.*

The project area consists of 1,464 acres in fee, and 248 acres in flowage easement. Of the fee lands, 55 percent (800 acres) are forested (25 acres of which are forested wetlands), 23 percent (345 acres) are non-forested wetlands (for a total of 370 acres of wetlands), and 5 percent (70 acres) is open area. The remainder of the project area consists of developed areas that include the impoundment and its attendant features, roads, parking areas, picnic areas, project office, campground, hydroelectric plant, and other public support facilities.

3.2 NATURAL RESOURCES

3.2.1 Geology and Soils

Situated in Windsor County, the North Hartland Lake project was subject to glaciation during the Pleistocene Epoch, which began about one million years ago. Glaciation rounded and smoothed the bedrock, hills, and ridges of the area, and covered them with a thin layer of till, a combination of sand, silt, and clay-size particles. The final retreat of the Wisconsinian, or Laurentide ice sheet occurred approximately 12,000 years ago, leaving varied geologic formations within and around the bounds of the project. Parent material evident at the site includes bedrock, glacial till, glacial outwash, ice contact, eskers, glacial lake, and alluvial deposits. The most distinct geologic feature located within the bounds of the project is the spectacular Quechee Gorge. The gorge lies at the upstream end of the North Hartland Lake reservoir and is characterized by outcrops of Devonian schist and limestone. The gorge is 163 feet deep, 4000 feet long, approximately 200 feet wide, and constitutes the largest and deepest gorge in the State of Vermont.

The hydrologic nature and hydrodynamics of the Ottauquechee River have been significantly influenced as a result of the construction and operation of the dam at North Hartland Lake. As a result, substantial amounts of alluvial material have been deposited at higher floodplain elevations than would normally occur

relative to a river of this size. This phenomena has resulted in rich surface soils (silt loams, etc.) facilitating an extremely lush herbaceous plant community in areas that were previously characterized by gravelly and cobbly upland-slope soil types.

Review of the *Interim Soil Survey Report for Windsor County, Vermont* (Figure 3-1, August, 1997) indicates that approximately 15 distinct soil map units occur within the limits of the project. These map units are designated as: Hitchcock, Belgrade, Windsor, Agawam, Hinckley, Glover-Vershire, Ondawa, Buckland, Udorthents-Udipsamments, Cabot, Lyman, and Markey-Wonsqueak. Detailed descriptions of the six prevalent and significant soil types found at the site are provided below and tables outlining soil suitability for the prevalent soil types are located in Appendix D.

Windsor

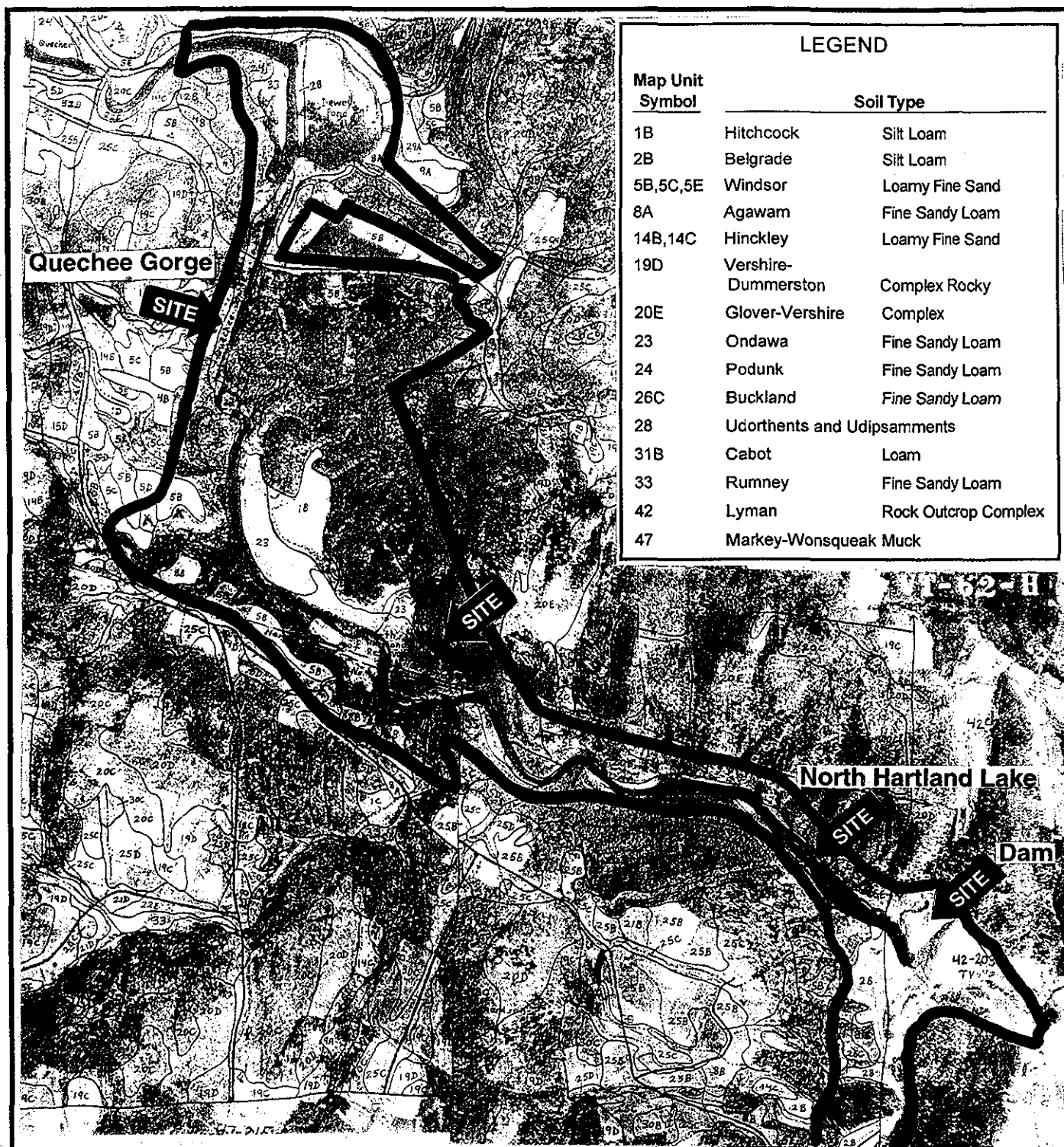
The well-drained Windsor soils are found ubiquitously throughout the riparian upland areas at the North Hartland Lake project. These loamy fine sands constitute the most common soil type at the site, and have formed in sandy deposits on stream terraces, deltas, eskers, and outwash plains. The Windsor soils are typically associated with the excessively-drained Hinckley soils, and well-drained Agawam and Hitchcock soils.

Glover-Vershire

The steep hillsides north of the North Hartland Lake reservoir proper are characterized by these soils. The very rocky Glover-Vershire complex consists of approximately 55 percent shallow, somewhat excessively-drained Glover soils, 30 percent moderately deep, well-drained Vershire soils, and 15 percent other soils. Rock outcrops and ledge make up between 2 and 10 percent of this map unit. A thin layer of undecomposed leaves, twigs, and needles typically covers both of these soil types. Depth to bedrock is usually at 22 inches or less.

Markey-Wonsqueak

The Markey-Wonsqueak mucks are hydric (wetland) soils consisting of organic soils up to 24 inches deep (histosols) underlain by up to 3 feet of loamy fine sand. These soils are found in depressions and narrow flat areas and are frequently ponded for long periods. The Markey-Wonsqueak mucks occur in the scrub-shrub/emergent marshes at the project east of the gorge and east of the access road to the project office and dike.



SOURCE: USDA/Soil Conservation Service, 1992
Windsor County, Vermont
Sheets 42-21, and 47-217

Scale
1 in. : 2,344 ft.

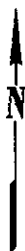


FIGURE 3-1
USDA/SCS WINDSOR COUNTY
INTERIM SOIL SURVEY
USACOE North Hartland Lake Project
Hartland and Hartford, VT

DRAWN: JKT	DATE: July 29, 1998	PROJECT NO.: 9000-175-106	REV:
FILE NO.:	CHECKED: DC		

Hitchcock

This soil map unit is found within the area encompassed by the grassy upland floodplain east of the Ottauquechee River south of the gorge. The Hitchcock silt loam with 3-8% slope is designated as a *Section 250 Primary Agricultural Soil* by the U.S. Department of Agriculture, and consists of very deep, well-drained soils. These soil map units formed in silty deposits on alluvial terraces and are usually greater than 6 feet above the seasonal high water table.

Ondawa

This soil map unit consists of very deep, well-drained soils formed in loamy alluvial deposits on flood plains of relatively large rivers and streams. At the project site, Ondawa soils occur adjacent to the Hitchcock map unit, on the floodplain terraces covered primarily by herbaceous vegetation. Important soil properties of the Ondawa map unit include moderate to moderately rapid permeability, moderate water capacity, depth to seasonal high water table of greater than 6 feet, and depth to bedrock greater than 5 feet.

Lyman

The very stony Lyman-Rock Outcrop complex soils are commonly found on ridges and sideslopes of hills and mountains. At the North Hartland Lake project, this soil map unit occurs along the west side of Quechee Gorge. It consists of about 65 percent shallow, somewhat excessively-drained Lyman soils and 20 percent rock outcrops. Other soils make up about 15 percent of this map unit. Rock outcrops consist of gneiss, schist, phyllite, and quartzite. Stones and boulders cover as much as 3 percent of the surface and are generally 5 to 25 feet apart.

3.2.2 Water Quality

Over the past two decades, various water quality studies have been conducted at North Hartland Lake and the reach of the Ottauquechee River, in the vicinity of Quechee Gorge, for purposes of establishing and updating the classification of these waters. Formal correspondence with the Vermont Water Resources Board during July 1997, has concluded that the reach of the Ottauquechee River within the project area (including North Hartland Lake) has been designated as Class B. The state's management objectives for Class B Waters include the . . . "*perpetuation of good aesthetic value, public water supply with prior disinfection, swimming, and other primary and secondary contact recreational activities, irrigation for agricultural activities, and fish and wildlife habitat.* . . ." North Hartland Lake and the Ottauquechee River downstream of the dam to its confluence with the Connecticut River, is further designated as a warm-water fishery, while the Ottauquechee River upstream of North Hartland Lake is designated as a cold-water fishery.

Vermont Class B warm-water fish habitat standards include dissolved oxygen (DO) not less than 5 mg/l, nor 60 percent of saturation at any time. Other standards include pH in the range of 6.5 to 8.0 standard units, *Escherichia coli* bacteria not to exceed 77 organisms per 100 ml, color not to exceed 25 standard color units, and turbidity not to exceed 25 NTUs.

Vermont Class B cold-water fish habitat standards include DO not less than 7 mg/l, nor 75 percent of saturation at any time, nor less than 95 percent saturation during late egg maturation and larval development of salmonids. The Agency of Environmental Conservation determines which salmonid spawning or nursery areas are important to the establishment or maintenance of the fishery resource. Dissolved oxygen levels should not be less than 6 mg/l or 70 percent of saturation at all times in all other waters designated as cold-water fish habitat. Other standards include pH in the range of 6.5 to 8.0 standard units, *Escherichia coli* bacteria not to exceed 77 organisms per 100 ml, color not to exceed 25 standard color units, and turbidity not to exceed 10 NTUs.

Vermont standards do not give numerical limits applicable to phosphorus levels in lakes like North Hartland. Instead they state there shall be no increase in all waters of total phosphorus above background conditions that may contribute to the acceleration of eutrophication, or the stimulation of the growth of aquatic biota in a manner that has an undue adverse affect on any beneficial values or uses of any adjacent or downstream waters.

The USACE groups the flood control projects it operates and maintains into three categories based on water quality conditions. Factors used in the assignment of classes include state water quality reports, including information on upstream watershed activities, identifiable changes between inflow and discharge water quality, frequency of violations of water quality criteria, assessments of water quality by USACE personnel familiar with the projects, and the existence of a conservation pool. Simply stated, Class I projects have high water quality, Class II projects have minor or suspected water quality problems, and Class III projects experience continuing water quality problems. These classifications are used to prioritize the frequency and intensity of water quality monitoring activities.

In order to use resources efficiently, while meeting requirements to monitor water quality trends and changes at projects, the USACE splits its baseline water quality program into high and low level monitoring. Briefly, the difference between these two levels is in the statistical certainty of results. High level baseline monitoring involves a higher level of statistical certainty, and a larger number of samples than low level monitoring. Low level fixed station monitoring is applied at Class I and Class II projects, and high level monitoring is applied at Class III projects. "Fixed-station monitoring" means that sampling is confined to certain stations considered representative of water quality at the project as a whole. Class III

projects have the highest priority for intensive survey or other special studies, and Class I projects have the lowest. North Hartland Lake is a Class II project as a result of high phosphate levels in the Lake. This situation is under study.

The USACE has been monitoring water quality at four inflow stations and one outflow station within the North Hartland Lake flood control project since 1971. The primary purpose of this program is to protect public health and safety, but additional goals include meeting state water quality standards, maintaining water quality suitable for project purposes, understanding the effects of project operations on water quality, and monitoring trends which could indicate an improvement or degradation of the project's water quality.

Water quality activities at North Hartland Lake primarily involve baseline beach, and potable water monitoring. There are three main water quality stations presently being used by the USACE at the project. NH1A is located 4.2 miles upstream of the dam in Quechee Village, just above Dewey's Pond. NH1B is located 3 miles upstream of the dam and downstream of Quechee Gorge. NH05A is located downstream of North Hartland dam. In addition, water quality is monitored at the beach (NH06) and at the well at the recreation area (NHDW-1). There are several other stations at which water quality has been measured one or more times since the USACE began its program at North Hartland Lake in 1971.

As a Class II project with a conservation pool, low level monitoring is conducted at North Hartland Lake about every three years. Water samples are analyzed for temperature, DO, pH, turbidity, conductivity, *Escherichia coli*, alkalinity, nitrogen and phosphorus. In addition, heavy metals or other substances may be measured at these stations. The most recent years in which data was collected are 1991 and 1995. The beach station is monitored for *Escherichia coli* every two weeks from approximately Memorial Day to Labor Day. The well is monitored quarterly for *Escherichia coli* and annually for nitrate.

Water Quality: North Hartland Lake's overall water quality is good in that it generally meets state standards and is suitable for all intended uses. Measurements of most parameters show the water is generally as good or better than Class B standards. Algal nutrient levels have historically been in the range typical of a borderline oligotrophic/mesotrophic impoundment, but recently have increased to levels which could cause it to become eutrophic or even highly eutrophic. Metal concentrations are very low, typical of background levels. The waters are free of floating oils and pollutants that form objectionable deposits or nuisances.

Dissolved Oxygen: Levels are rarely less than the 6 mg/l minimum for Class B waters, and pH levels are on the alkaline side of neutral, and approach, and occasionally exceed the 8.0 upper limit for Vermont Class B waters. High pH levels are most likely caused by the natural geologic conditions in the watershed.

Escherichia coli: Levels are generally low. Counts at the baseline monitoring stations show a wide variation, ranging from less than 1 to 100 organisms per 100 ml. None of the seven samples collected during 1995 baseline monitoring were above the Class B standard of 77 organisms per 100 ml. It is rare for counts at the beach to exceed standards, and when that does happen, it is after heavy rains.

Nitrogen and Phosphorus: Levels of nitrogen and phosphorus, the primary algal nutrients, historically ranged between 0.05 and 0.20 mg/l, and 0.01 and 0.03 mg/l, respectively, and were fairly uniformly spread throughout the lake. Nitrogen levels were low and typical of an oligotrophic lake, while phosphorus levels were between levels typical of oligotrophic and mesotrophic conditions. It was not clear whether phosphorus or nitrogen was limiting. The long hydraulic residence time in the impoundment indicated that the lake would be highly susceptible to water quality degradation, due to algae blooms, if the nutrient levels were high enough. In general, such waters should provide for good water-contact recreation. In late 1997, and continuing into 1998, large increases in phosphorus levels were found in the Ottauquechee River entering the lake. The source has not yet been determined. These high phosphorus levels were causing billowing clouds of the filamentous algae *Oedogonium* to develop in the upper parts of the reservoir. If these phosphorus levels continue, it may severely impact recreational use of the project.

All groundwater in the state of Vermont is classified as Class III, unless reclassified by the Secretary as Class I, II, or IV. Class III groundwater is suitable as a source of water for individual domestic drinking water supply, irrigation, agricultural use, and general industrial and commercial use. Class I groundwater is suitable for public water supply and has no exposure to activities which pose a risk to its current or potential use as a public water supply. Class II groundwater is suitable for public water supply use and is exposed to activities which pose a risk to its current or potential use as a public water supply. Class IV groundwater is not suitable as a source of potable water, but may be suitable for agricultural, industrial, and commercial uses. No groundwater in the vicinity of North Hartland Lake has been reclassified and, therefore, is all Class III. The only groundwater monitoring at the project is measurements of coliforms and nitrate in the drinking water well. Results have shown consistently good conditions.

3.2.3 Wetlands

In 1997, a formal *Wetlands Community Description* was prepared by the Corps, New England District relative to the North Hartland Lake project. The aim of this study was to identify and characterize the surface waters and wetland communities on the project site. A modified version of the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al., 1979) classification system was used to identify and evaluate wetlands on the site greater than ¼ acre in size. Roughly 25 percent of the project area (370 acres) is comprised of jurisdictional wetlands and waterways (Figure 3-2). The following text and table provides a summary of the findings of the 1997 wetlands report.

The wetlands associated with the Ottauquechee River are an integral part of the flood control project at North Hartland. These wetland areas assist in reducing potential flood damage downstream of the Ottauquechee and Connecticut River by temporarily storing floodwaters. The flood storage function of the wetlands also aids to decrease the velocity of the water within these watercourses and lessen wave action, thereby reducing the rivers' erosive potential. Other functions and values that the wetlands within the project provide include toxicant/nutrient attenuation, groundwater recharge, fish and wildlife habitat (including endangered species), recreation, educational value, and aesthetics. Under the classification system used to identify and map wetlands at the North Hartland Lake project, seven distinct wetland types were found. These include LAB1, POW, PEM1, PSS1, PFO1, PFO4, and R as noted on Figure 3-2.

The Ottauquechee River enters the boundary of the North Hartland Lake flood control project as it passes under the Quechee covered bridge. The river meanders in an easterly direction until it nears Dewey's Mill Pond. The river then bends sharply to the south, following alongside a dike separating the pond from the river channel. The river passes by an emergent wetland and backwater area on the western shore until it reaches the Dewey's Mills Hydroelectric Power Generating Station. Once past the mill, the river enters Quechee Gorge. The river then continues south, passing under U.S. Route 4.

Several intermittent streams and groundwater seepages provide hydrology to forested and scrub-shrub wetlands east of the gorge. As the river exits the gorge, it flows past a large herbaceous (emergent) marsh to the east. This marsh acts as a spillover area when the river is cresting during times of high flow, while additionally providing excellent foraging and cover opportunities for numerous songbird species and other wildlife. Downstream of the marsh, the river continues to flow in a southeasterly direction, where it discharges to the reservoir associated with the North Hartland Lake flood control project. The lake also receives hydrologic inputs from several streams originating from the hillside slopes to the north and south. Harlow Brook, which flows perennially, is the only named brook that supplies water to the lake.

Minimal emergent riparian vegetation occurs along the river in this area, but scrub-shrub wetlands composed primarily of alder (*Alnus* spp.) and facilitated by groundwater seepage, fringe the southern boundary of the lake. Two significant wetlands within the project are located in the vicinity of the access road to the recreation area. The first occurs to the west of the dike/access road and discharges to North Hartland Lake just upstream of the dam via a perennial watercourse. The second is an emergent wetland located due east of the access road/dike which flows under the dike to discharge into the first wetland. As water from the river passes through the dam toward another hydroelectric plant, it exits the project boundary, passes under U.S. Route 5, and discharges to the Connecticut River.



LEGEND

LACUSTRINE

LAB1 Rooted Aquatic Bed Vegetation
in Lake Water, More Than 20 Acres

PALUSTRINE SYSTEM

POW Open Water, Less Than 20 Acres
PEM1 Emergent Vegetation, Persistent
PSS1 Shrub/Scrub Broad-Leaved
PFO1 Forested Broad-Leaved Deciduous
PFO4 Forested Needle-Leaved Evergreen

RIVERINE SYSTEM

R Open Water Contained Within a Channel
Stream

MODIFIERS

^ Semi-Permanently Flooded
+ Seasonally Flooded
h Diked/Impounded

NON-WETLAND

U Upland
--- Project Boundary

Figure 3-2 page 1

WETLAND MAP
Upper Connecticut River Basin
NORTH HARTLAND LAKE

The most prevalent wetland type occurring within the bounds of the project are Lacustrine Aquatic Bed (LAB1). LAB1 wetlands are lacustrine systems with rooted, vascular vegetation greater than 20 acres in size or greater than 6.6 feet in depth. Dewey's Mill Pond and North Hartland Lake contain LAB1 wetlands. Riverine wetlands are common on the site as well, and consist of open, flowing water contained within a channel. The Ottauquechee River is a riverine system.

Palustrine Emergent wetlands (PEM1) occur in various locations throughout the project. These wetlands are shallow marshes with persistent herbaceous vegetation. Northwest of the reservoir, along the northern bank of the Ottauquechee River, lies the single largest vegetated wetland within the project boundary. This marsh is over 40 acres in size and is composed primarily of eastern joe-pye weed (*Eupatorium maculatum*) and swamp goldenrod (*Solidago uliginosa*).

A small, shallow pond (POW) occurs south of the dike, along the access road into the recreation area, in the southeasternmost portion of the project. POWs are Palustrine Open Water wetland systems less than 20 acres in size and less than 6.6 feet in depth.

The remaining wetland types at the project are only minimally present, and include PSS1, PFO1 and PFO4. PSS1 are Palustrine Scrub-Shrub Broad-Leaved Deciduous wetlands and at the site, are characterized by a dominance of alder (*Alnus* spp.). PFO1 and PFO4 are Palustrine Forested Broad-Leaved Deciduous and Palustrine Forested Needle-Leaved Evergreen wetlands respectively, and which typically occur along the feeder streams to the Ottauquechee. Table 3-1 below, summarizes the wetland types and acreages identified and mapped at the North Hartland Lake project during the August, 1997 Wetlands Community Description effort.

Table 3-1
Wetland Types and Acreages
North Hartland Lake, Vermont

Wetland Type	Description	Acreage
Lacustrine		
LAB1	Aquatic bed (vegetation rooted, vascular)	223.4
Palustrine		
PEM1	Emergent (vegetation persistent)	53.6
PFO4	Forested needle-leaved evergreen	14.6
PFO1	Forested broad-leaved deciduous	10.1
PSS1	Scrub-shrub broad-leaved deciduous	7.9
POW	Open water (less than 20 acres)	2.2
Riverine		
R	Open water confined to a channel	57.7
Misc.		
Streams	Intermittent stormwater drainages	1.6 miles
TOTAL		369.5 acres of wetlands 1.6 miles of stream

Source: USACE, 1997

Invasive Species

The invasive plant species purple loosestrife (*Lythrum salicaria*) and common reed (*Phragmites australis*) occur at the project site. Purple loosestrife is a particular nuisance as it annually colonizes the rip-rap embankments of the dam.

3.2.4 Vegetative Cover

Forest Lands

Approximately 800 acres (55 percent) of the North Hartland Lake project area is forested. Much of the forested area is in second-growth northern hardwoods or mixed hardwoods-softwoods. The principal cover types include eastern white pine (*Pinus strobus*), eastern hemlock (*Tsuga canadensis*), eastern white pine – eastern hemlock association, and sugar maple (*Acer saccharum*) – American beech (*Fagus grandifolia*) – yellow birch (*Betula allegheniensis*) association. Approximately 25 acres (3%) of the forests at the project are jurisdictional wetlands. These forest types were classified according to the *Forest Cover Types of North America*, published by the Society of American Foresters (refer to Figure 3-3).

The cover type of greatest occurrence within the project is mixed hardwood and softwood, represented by the eastern white pine – northern red oak (*Quercus rubra*) – white ash (*Fraxinus americana*) designation. This cover type is found throughout the unleased area with variations in stand composition. Eastern white pine constitutes the second most abundant cover type. It is found throughout the area in small (generally less than 20 acres) stands.

The last major forest type at the site is mixed hardwood, with American beech, yellow birch, and sugar maple as the dominant species. This forest type lies along the eastern portion of the reservoir, with the majority south of the lake.

A forest inventory of lands at the project site not leased to the state of Vermont was conducted during the summer of 1981. Additional tree species not mentioned above, and documented during this investigation included: white oak (*Quercus alba*), white birch (*Betula papyrifera*), sweet birch (*Betula lenta*), big tooth aspen (*Populus grandidentata*), butternut (*Juglans cinerea*), bitternut hickory (*Carya cordiformis*), basswood (*Tilia americana*), black cherry (*Prunus serotina*), and eastern hophornbeam (*Ostrya virginiana*) (USACE, 1995).

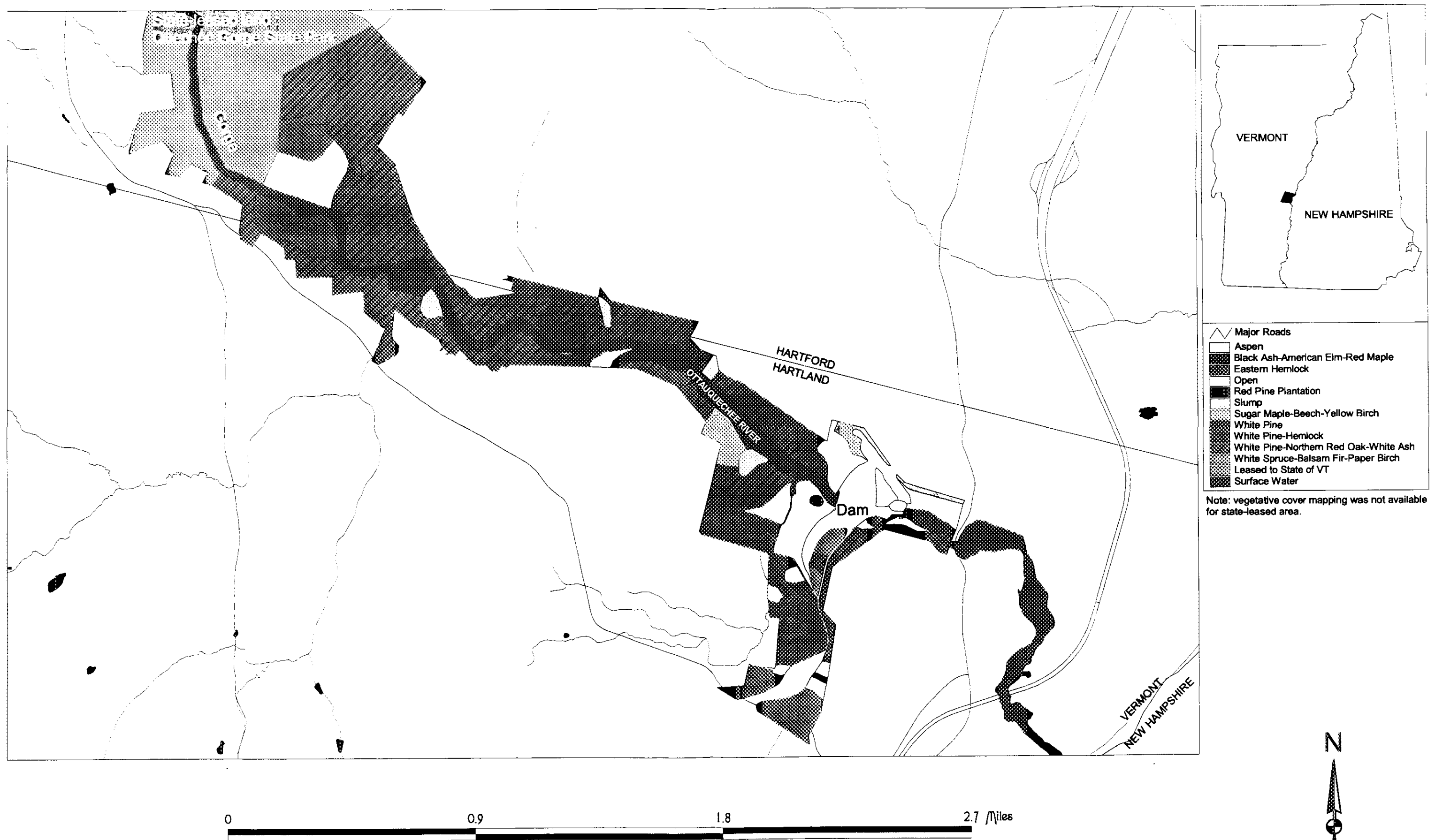


Figure 3-3 North Hartland Lake Vegetative Cover Types

Currently, no timber harvesting activities are being conducted in forests within the bounds of the project. Selective pruning and clearing is conducted on hiking and interpretive trails and within Quechee State Park. As much of the project's timber resources are located in land areas under the Multiple Resources Management Category (Section 6.2), controlled harvesting of timber is a viable option at this project. Valuable tree species typically logged for lumber, cordwood, and pulpwood occur at North Hartland Lake, including eastern white pine, northern red oak, white oak, black cherry, American beech, and red maple.

Open Lands (Grass and Old Fields)

Grass and old fields on the site total approximately 170 acres (10%). Open areas at the site include maintained (mowed) areas surrounding the project office, access roads, recreation areas, dam facility, as well as a 30-acre grassland maintained by floodwaters and ice action along the east side of the Ottauquechee River, just downstream of Quechee Gorge. In addition, open areas exist along the periphery of Dewey's Mill Pond. Open lands within the bounds of the project are managed to maintain the structural integrity of the flood control facility infrastructure, as well as to promote the success of wildlife species which require these areas for nesting and forage.

The USACE conducts prescribed burns and limited timber harvesting at target areas within the Project to assist in the enhancement of vegetative community diversity and to provide for the adequate maintenance of Corps flood control infrastructure.

Quechee Gorge

Quechee Gorge is characterized by a partially wooded vegetative composition in areas where at least minimal soil development is present. However, the majority of the gorge is characterized by nearly vertical rock walls, which support only herbaceous plant species, mosses, and liverworts. Despite the seeming habitat limitations in the gorge relative to vegetative growth, over one thousand individual plant species were documented in the gorge during a 1995 formal inventory. During this inventory, a Vermont-listed rare plant was identified as well. Four other state-listed plants were identified in the gorge between 1910 and 1980, but none of these species were observed during the 1996 survey. The flat benches that accumulate sediments when the gorge is flooded are characterized by a dominance of non-native plant species. The most abundant of these species include purple loosestrife, Kentucky fescue (*Festuca arundinacea*), European alder (*Alnus glutinosa*), glossy buckthorn (*Rhamnus frangula*), and Morrow's honeysuckle (*Lonicera morrowii*) (Vermont Fish and Wildlife Department, 1996).

Developed Areas

Developed areas at the North Hartland Lake project include the impoundment and its attendant features, dike, spillway, roads, parking facilities, picnic areas, the project office, campground, hydroelectric plants, and other public support facilities. These areas total approximately 393 acres, which represents roughly 23% of the total project acreage.

Unique Natural Communities

In the summer of 1996, the Vermont Fish and Wildlife Department, Non-Game and Natural Heritage Program, under contract with the USACE, prepared a report on the *Rare Plants and Animals and Significant Natural Communities at North Hartland Lake*. No natural communities of statewide significance were found. However, two natural communities of local significance were documented. These areas, as well as additional areas identified by ENSR ecologists considered to be noteworthy are described below.

Oak-Pine Forest

During the 1996 inventory of significant natural communities, a locally significant northern red oak-white pine forest was identified within the bounds of the project site on the north side of the reservoir. Located on a steep, sandy, south-facing slope above the reservoir, this forest is notable for its abundance of large, mature white oak trees and sparseness of groundcover vegetation. The presence of a stonewall indicates that this area may have been used as an open or wooded pasture in the past.

Rich Northern Hardwood Forest

Also identified during the 1996 significant natural community study, and located on the west side of the river at the southern end of Quechee Gorge, is a locally significant example of a rich Northern Hardwood Forest. This forest occurs on a steep slope above the river. Near the top of the slope, a sand deposit overlies bedrock, and is quite deep. Here hemlock and yellow birch dominate the forest canopy, with a minimal presence of sugar maple and American beech. The prevalent herbaceous stratum species in this area includes Christmas fern (*Polystichum acrostichoides*) and lady fern (*Athyrium filix-foemina*). Although not uncommon statewide, this forest type is unusual within the subject property.

Emergent Riparian Marsh

Review of the 1997 *Wetlands Community Description* for North Hartland Lake indicates that a particularly valuable wetland resource area exists within the bounds of the project site. A palustrine emergent marsh greater than 40 acres in size is located on the eastern bank of the river and downstream of Quechee Gorge (Figure 3-2). Prevalent vegetation within this wetland includes joe-pye weed and swamp goldenrod. As unmaintained open vegetated areas are only minimally present at the site, this area serves as critical nesting habitat for songbirds and other wildlife species.

Floodplain Meadow-Terraces

Located downstream of Quechee Gorge, and along the eastern upland edge of the river, lies an extensive terraced, meadow area, approximately 30 acres in size. These upland riparian fields are periodically inundated by floodwaters in late autumn. Flood events during winter months cause lake ice to be deposited over these terraces crushing all shrub and sapling-layer vegetation. Through this process, these meadows are naturally maintained. In some areas, these fields span a lateral distance of approximately 600 feet from the river's edge to the adjacent wooded uplands. Dominant vegetative species include goldenrods (*Solidago* spp.), fescues (*Festuca* spp.), milkweeds (*Asclepias* spp.), box elder sapling and minimal alder shrubs. This area has significant potential to provide nesting habitat to numerous songbird species that require this habitat type, including bobolink (*Dolichonyx oryzivorus*), eastern meadowlark (*Sturnella magna*), and grasshopper sparrow (*Ammodramus savannarum*). ENSR ecologists identified this area as not only locally, but regionally significant, as large, upland expanses of tall grass along river valleys is rare in New England. The flood storage activities associated with this project are the driving force behind the occurrence of this habitat.

3.2.5 Wildlife

Numerous mammal, bird, amphibian, and reptile species can be found in the project area. Tables C-1, C-2 and C-3 (Appendix C) provide a list of wildlife species expected to occur within the bounds of the North Hartland Lake project. Expected occurrences are based on field determinations of habitat and habitat features, followed by consultation of *New England Wildlife: Habitat, Natural History, and Distribution* (DeGraaf and Rudos, 1983).

Many of the indigenous wildlife species at the project depend on the openings and ecotone present between forests and fields. With extensive tracts of woodlands at the site, maintaining the fields and forest openings are critical to increase the diversity of habitat types for wildlife. Mature conifer stands at the site are essential for wintering white-tailed deer (*Odocoileus virginianus*). Other forest wildlife species, such as ruffed grouse (*Bonassa umbellus*) are dependent on various stages of forest succession. North

Hartland Lake receives light to moderate hunting pressure, depending on the species. Popular game species hunted include white-tailed deer, ruffed grouse, woodcock (*Philohela minor*), and wild turkey (*Meleagris gallopavo*). Trapping pressure is light to moderate at the site, with muskrat (*Ondatra zibethica*), fisher (*Martes pennanti*), raccoon (*Procyon lotor*), beaver (*Castor canadensis*), and mink (*Mustela vison*) as the favored target species (USACE, 1985).

Past habitat management programs have been limited to erecting artificial nesting cavities for wood duck (*Aix sponsa*) and eastern bluebird (*Sialia sialis*), with placing and maintenance of artificial cavities beginning in 1980, prescribed burns, and the planting of apple trees.

3.2.6 Fish

North Hartland Lake contains both warmwater and coldwater fishery habitat. North Hartland Lake and Dewey's Mill Pond are classified as warmwater fisheries while the Ottauquechee River and streams constitute coldwater fisheries. Numerous joint fisheries studies between the Corps of Engineers and the Vermont Fish and Wildlife Department (VTFWD) have been conducted at North Hartland Lake since 1965. Fish species documented during these studies are included in Table 3-2.

**Table 3-2
Fish Species Documented
At North Hartland Lake**

Scientific Name	Common Name
<i>Ambloplites rupestris</i>	Rock Bass
<i>Ameiurus nebulosus</i>	Brown Bullhead
<i>Catostomus commersoni</i>	White Sucker
<i>Esox lucius</i>	Northern Pike
<i>Lepomis gibbosus</i>	Pumpkinseed
<i>Lepomis spp.</i>	Sunfish
<i>Micropterus dolomieu</i>	Smallmouth Bass
<i>Micropterus salmoides</i>	Largemouth Bass
<i>Notropis cornutus</i>	Common Shiner
<i>Notropis hudsonicus</i>	Spottail Shiner
<i>Oncorhynchus mykiss</i>	Rainbow Trout
<i>Perca flavescens</i>	Yellow Perch
<i>Rhinichthys atratulus</i>	Blacknose Dace
<i>Rhinichthys cataractae</i>	Longnose Dace
<i>Salvelinus fontinalis</i>	Brook Trout
<i>Semotilus atromaculatus</i>	Creek Chub
<i>Semotilus corporalis</i>	Fallfish

Source: Vermont Fisheries and Wildlife Department, 1965-1980.

Between 1965 and 1969, the VTFWD periodically stocked North Hartland Lake with a total of 20,000 brown trout (*Salmo trutta*) in the 8-9 inches class size. Due to low angler return and low quality salmonid habitat, this program was discontinued. Frequent water level fluctuations and lack of ideal salmonid habitat led State fisheries biologists to attempt the establishment of a self-sustaining warmwater fishery at North Hartland Lake. Between the spring of 1970 and June of 1980, nearly 50,000 largemouth bass fingerlings and 1,700 tiger muskies (*Esox lucius*) were introduced to the lake with this intent in mind. These stockings represented five individual efforts, and proved to have disappointing results. Fisheries surveys conducted following each stocking yielded almost no return of the target species. The data from these investigations indicated a warmwater fishery in poor condition, with game fish nearly absent.

In addition, yellow perch (*Perca flavescens*) and brown bullhead (*Ameiurus nebulosus*) were determined not to be of sufficient size to support a recreational fishery. However, adequate forage for predatory species was evident, as white sucker (*Catostomus commersoni*) brown bullhead, and sunfish (*Lepomis* spp.) comprised 95% of the sample by weight.

Formal recommendations by the VTFWD following the aforementioned efforts prior to 1980 resulted in the Corps maintaining a normal pool elevation at the lake of 425 NGVD throughout the year, in an effort to better control extreme hydrologic fluctuations. The Corps has conducted a survey of the fisheries and water quality at North Hartland Lake (Lakewatch Investigation, USACE 1999) to determine the current condition of the fishery. Findings of this study will be evaluated and appropriate improvements will be incorporated in the Operational Management Plan for the project.

Although not as intensive, similar efforts by the VTFWD to establish a self-sustaining warmwater fishery at Dewey's Pond were attempted between 1976 and 1980. Approximately 2,600 largemouth bass were released in the pond during two separate efforts. Fisheries surveys performed subsequent to these stockings also revealed poor spawning success of the bass.

The potential for a coldwater fishery at North Hartland Lake is rather limited. The existing one is completely natural in origin, self-sustaining, and capable of supporting light fishing pressure. Correspondence with Mr. John Claussen of the VTFWD indicates that rainbow trout (*Oncorhynchus mykiss*) are currently stocked at the lake on an annual basis, although little data exists relative to the angler return resulting from this program. Several brooks emptying into the reservoir as well as a stretch of the river may be suitable for salmonid management, although habitat and hydrologic conditions are not especially suitable. A relatively small, self-sustained brown trout fishery occurs in the Ottauquechee River from Dewey's Mill Dam through Quechee Gorge, and to the head of the main pool. Limited suitable spawning areas exist within this stretch. In addition, self-sustaining brook and brown trout populations capable of supporting light fishing pressure can be found in Harlow Brook. This brook is characterized by

steady flows with an adequate pool-run-riffle complex. Four other unnamed brooks which discharge to the Lake may also support small populations of brown trout and brook trout, although very low flows within these brooks during the summer months are a limiting factor.

Correspondence with fish biologists of the VTFWD in 1998 has concluded that an angler return study should be initiated relative to the annual rainbow trout stocking efforts conducted by this agency. Such a study would reflect the success and/or value of this annual stocking program.

3.2.7 Rare, Threatened and Endangered Species

Formal correspondence (May, 1998-Appendix A) with the United States Department of the Interior Fish and Wildlife Service (New England Field Office) has confirmed that no federally-listed or proposed threatened or endangered species are known to occur in the project area, with the exception of occasional, transient bald eagles (*Haliaeetus leucocephalus*) or peregrine falcons (*Falco peregrinus*). Additional information provided by the USFWS indicates that endangered dwarf wedgemussels (*Alasmodonta heterodon*) and endangered Jesup's milk vetch (*Astragalus robbinsii* var. *jesupi*) occur downstream of the project area, on the Connecticut River.

In the summer of 1996, the Vermont Fish and Wildlife Department, Non-Game and Natural Heritage Program, under contract with the USACE, prepared a report on the *Rare Plants and Animals and Significant Natural Communities at North Hartland Lake*. As a result of this effort, 13 individual state-listed rare vascular plant species and 2 state-listed rare animal species were documented within the bounds of the project site. Table 3-3 summarizes the findings of this field inventory.

State-listed rare species were identified through intensive groundtruthing and reconnaissance of appropriate habitats between May and September of 1995, the timeframe during which most vascular plants are in flower, thus streamlining identification, through confirmation of diagnostic features. Thirteen individual sites for rare species were located, and in general, occur throughout the bounds of the project.

The greatest concentration of sites were recorded in the vicinity of the dam and North Hartland Lake, while only one site was documented upstream of Quechee Gorge. One rare species site was identified in Quechee Gorge itself, and additional rare plant species have been historically reported to occur within the Gorge. Specific details on the location of these sites are contained in the 1996 report.

On-site inspection of the project by an ENSR ecologist in June 1998 revealed the presence of great blue heron nesting sites not identified in the 1996 rare species inventory. As these new sites are located in a relatively visible area along the river, it is likely that the resident heron population at the project is growing.

Table 3-3
Rare Plants and Animals Identified
at North Hartland Lake, Vermont

Scientific Name	Common Name	State Rank
Plants		
<i>Agropyron trachycaulum</i>	Slender Wheatgrass	S3
<i>Aster ptarmicoides</i>	Upland White Aster	S2/S3
<i>Carex argyrantha</i>	Hay Sedge	S2
<i>Carex brevior</i>	Sedge spp.	S2/S3
<i>Chimaphila maculata</i>	Striped Wintergreen	S2
<i>Elymus wiegandii</i>	Wiegand's Wild Rye	S3
<i>Erigeron hyssopifolius</i>	Hyssop-Leaved Fleabane	S2
<i>Muhlenbergia tenuiflora</i>	Slender Muhly	S3
<i>Panax quinquefolius</i>	Ginseng	S3
<i>Panicum tuckermanii</i>	Tuckerman's Panic Grass	S1
<i>Physostegia virginiana</i>	Obedience	S2
<i>Poa saltuensis</i>	Bluegrass spp.	S2
<i>Potentilla arguta</i>	Tall Cinquefoil	S3
Animals		
<i>Ardea herodias</i>	Great Blue Heron	S2/S3
<i>Clemmys insculpta</i>	Wood Turtle	S3

Notes:

- S3: Uncommon; believed to be more than 20 occurrences and/or there is some threat to it in the state.
- S2: Rare; generally 6 to 20 occurrences; believed to be extant and/or some factor(s) making it vulnerable to extirpation in the state.
- S1: Very rare; generally 1 to 5 occurrences; believed to be extant and/or some factor(s) making it especially vulnerable to extirpation from the state.

3.3 CULTURAL RESOURCES

An archaeological reconnaissance survey of the North Hartland Lake project area was completed in March 1986 by the University of Vermont (Thomas and Bourassa, 1986). Goals of this survey were to stratify the project area into zones of archaeological sensitivity (high, moderate, and low) and prepare recommendations for a cultural resources management plan for the North Hartland Lake project in compliance with relevant federal legislation, including the National Historic Preservation Act of 1966, as amended. The following information is based upon the "Cultural Resource Management Study, North Hartland Lake," March 1986.

During the field testing and survey portions of the study, one (1) prehistoric site, two (2) find spots (possible prehistoric sites), and 20 historic period cultural resources were identified. Some of these sites were deemed potentially significant and further recommendations for avoidance and additional study were

described. In addition, many of the stratified zones of high or medium archaeological sensitivity would require further investigation. Recommendations for all known and potential historic and archaeological resources were offered and are summarized below. Please note the archaeological site locations are confidential information that is exempt from the Freedom of Information Act requirements, and cannot be divulged to the general public.

3.3.1 Prehistoric Resources

The regional setting of cultural development for eastern Vermont indicates the probability of over 10,000 years of human habitat in the Ottauquechee River watershed (Thomas and Bourassa, 1986). The location of prehistoric sites in the watershed was expected to be concentrated and denser downstream from the North Hartland Lake project area, especially near the mouth of the Ottauquechee River. (Thomas and Bourassa, 1986). The Ottauquechee River course and surrounding area can be characterized as typical New England upland terrain, with steep slopes above narrow watercourses with highly variable flow. Archaeological sites in such an environment, may be expected to be small and single component in nature, reflecting seasonal exploitation of resources.

One prehistoric site, VT-WN-60, was encountered on the eastern edge of Dewey Mill Pond. Limited testing recovered one chert flake removed from a stone tool. Two possible prehistoric sites, FS-WN-15 and FS-WN-16 were tentatively identified on terraces of two of the larger tributary streams within the project area. More intensive testing will be required before these deposits may be evaluated for archaeological significance and potential listing on the National Register of Historic Places. Until an intensive survey for prehistoric resources is conducted, all first, second, and third order terraces along the river and tributary streams and level areas adjacent to the foot of Quechee Gorge and Dewey's Mill Pond should be considered archaeologically sensitive with respect to prehistoric sites.

3.3.2 Historic Resources

Nineteen historic period archaeological sites and one site complex, Dewey's Mill, were identified from background studies conducted by the University of Vermont (Thomas and Bourassa, 1986). Four of these sites were dismantled or destroyed in the nineteenth or early twentieth centuries. Fifteen were demolished by the USACE when North Hartland Dam was constructed in 1960-61. The Jedediah Strong House, a property listed on the National Register of Historic Places, was left standing. Of the 20 identified sites, 14 sites (Historic Sites 5 through 18, 23 and 24 in Table 3-4 of the University of Vermont study) will require further site evaluation including documentary research, additional informant interviews, and archaeological testing to determine their significance and eligibility for potential listing on the National Register of Historic Places.

Table 3-4
Chronological List of Sites in the North Hartland Lake Project Area

GENERAL LOCATION	SITE NO.	SITE NAME	SITE DATE AND TYPE	RELATION TO COE LANDS: REAL ESTATE PARCEL
EARLY SETTLEMENT 1763 - 1820				
Hartford - Dewey's Mill Pond	10	Strong	1815 - farm/residence	Edge of mill pond: easement land Parcel B-244-E (Gilbert)
COMMERCIAL FARMING - INDUSTRY 1820 - 1900				
North Hartland Dam Hartland - Hartford border Hartford - Quechee and Dewey's Mill Pond	1	L.M. Wood	post-1855 - pre-1869 farm/residence	Below dam: Parcel A-101 (Gilman)
	2	Sawmill	pre 1855? - industrial	Near outlet works; Parcel A-101 (Gilman)
	3	Neal	pre-1855 - farm/residence	Near Spillway outlet: Parcel A-101 (Gilman)
	4	Badger	post-1855 - pre-1869 farm/residence	Under North Hartland Dam: Parcel A-103 (Nott)
	5	N. Wood	pre-1855 - farm/residence	Under permanent pool; Parcel A-116 (Vermont National & Savings Bank)
	6	Coolidge	post-1855 - pre-1869 farm/residence	Near Head of permanent pool: Parcel B-232 (Dickie)
	7	I.M. Wood	post-1855 - pre-1869 farm/residence	Between permanent pool and gorge: Parcel B-231 (Jonary)
	8	A.G. Dewey	pre-1855? - farm/residence (mill owner's retreat?)	At base of Quechee Gorge: Parcel B-200 (A.G. Dewey Co.)
	9	Dewey's Mill	1836 - industrial large mill complex	At head of Quechee Gorge: Parcel B-200 (A.G. Dewey Co.)
	11	Blacksmith Shop	post 1855 - pre-1869 craft/trade	Upstream limit of project area: Parcel B-218 (Picknell)
	12	Shattuck	post-1855 - pre-1869 farm/residence	Upstream limit of project area: Parcel B-218 (Picknell)
	15	Mrs. Strong	post 1855 - pre-1869 farm/residence	Town Aid Road No. 4, across from mill pond; Parcel B-223 (Ballard)
	16	C. Wright	post-1855 - pre-1869 farm/residence	Edge of project area, near Town Road No. 50: Parcel B-221 (Warren)
	17	Porter I	post-1855 - pre-1869 farm/residence	Edge of project area, near Town Road No. 50: Parcel B-220 (Keyes)
	18	Porter II	post-1855 - pre-1869 farm/residence	Edge of project area, near Town Road No. 50: Parcel B-222 (Dugan)
MARKETING AND DISTRIBUTION 1900 - present				
Hartford - Quechee and Dewey's Mill Pond	13	Coutermarsh	post-1869 - farm/residence	Edge of mill pond: Parcel B-226 (Coutermarsh)
	14	Banagan	post-1869 - farm/residence	Edge of mill pond: Parcel B-225 (Banagan)
	23	C. Banagan	post-1869 - farm/residence	Edge of mill pond: Parcel B-224 (Banagan)
	24	Perkins	post-1869 - farm/residence (possible camp?)	Near base of gorge: Parcel B-201 (Perkins)

3.4 RECREATIONAL RESOURCES

Both Vermont and New Hampshire continue to feel the pressure for providing enhanced recreational opportunities for residents and visitors from other parts of New England. The natural beauty and scenery provided by the project area will continue to attract the public and increase demand on the existing trail system and other facilities. An inventory of facilities is noted below.

3.4.1 Regional Recreational Resources

An inventory of resources within a 30 mile radius of the project site was undertaken to gain an understanding of the diversity and extent of recreational opportunities in the region. The region consists of 30 communities located in Vermont (17) and New Hampshire (13), as noted of Figure 3-4.

Table 3-5 identifies 89 different recreational areas and facilities including national forests, state parks, lakes, beaches and community parks and other open space areas. Fishing (43), picnicking (30) and boating (26) were the major recreational opportunities primarily provided within the state forests and parks. Hiking (24) and hunting (22) opportunities were also provided on public lands throughout the region.

The scarcity of publicly owned surface waters for public beaches and swimming has placed additional demands on North Hartland Lake.

3.4.2 North Hartland Lake Area

The following is a brief overview of the facilities located at the North Hartland Lake area and near the Quechee Gorge.

3.4.2.1 North Hartland Lake Recreation Area

The recreation area at North Hartland Lake consists of approximately 16 acres of land, of which 8 acres is cleared open space (see Photo 1). The remainder is forested trail areas. A general description of the recreational activities and facilities that are presently offered for public use at North Hartland Lake are described below and as noted on Figure 3-5. Figure 3-6 identifies the location of scenic assets associated with North Hartland Lake.

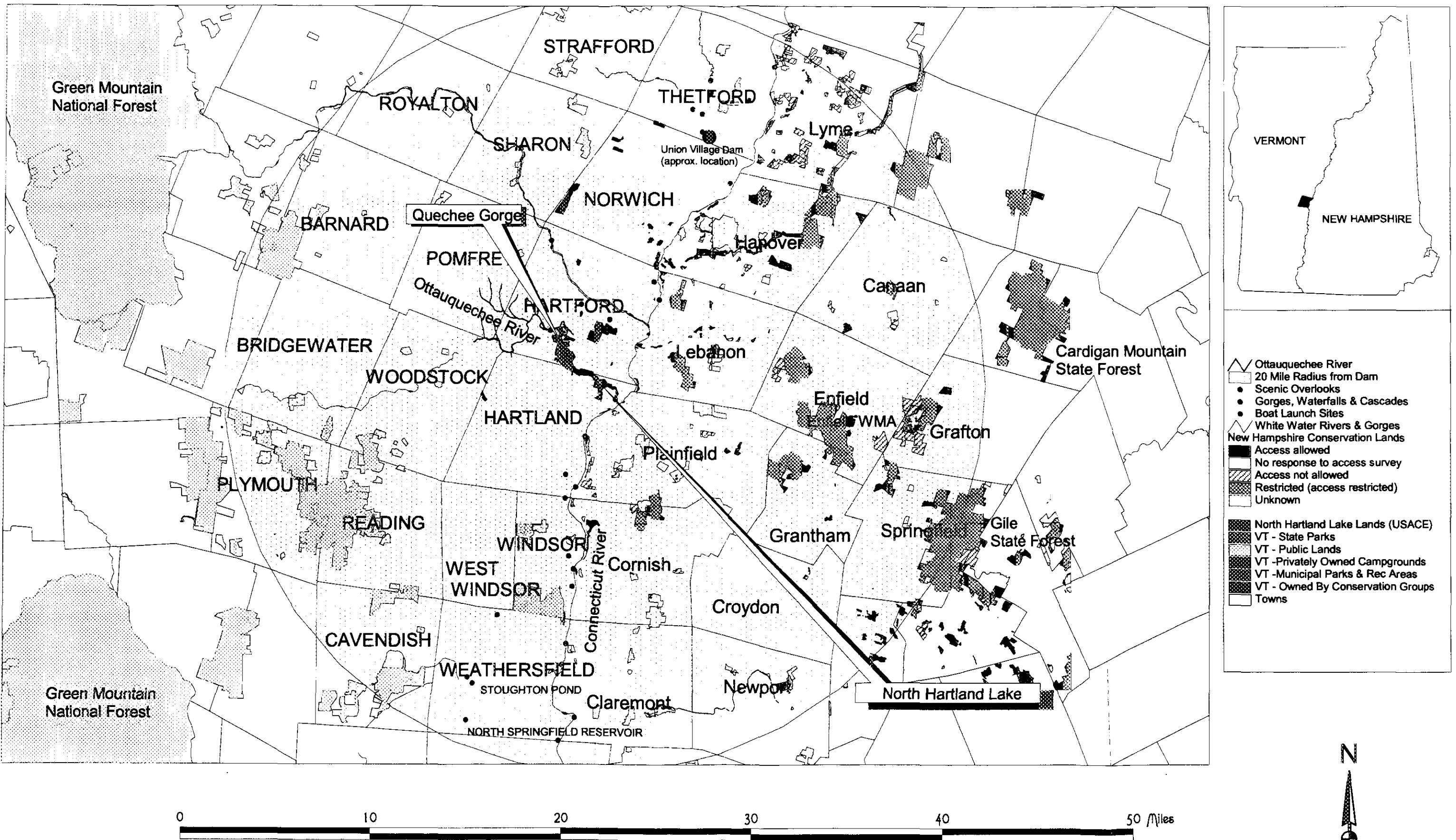


Figure 3-4 Regional Recreation Facilities

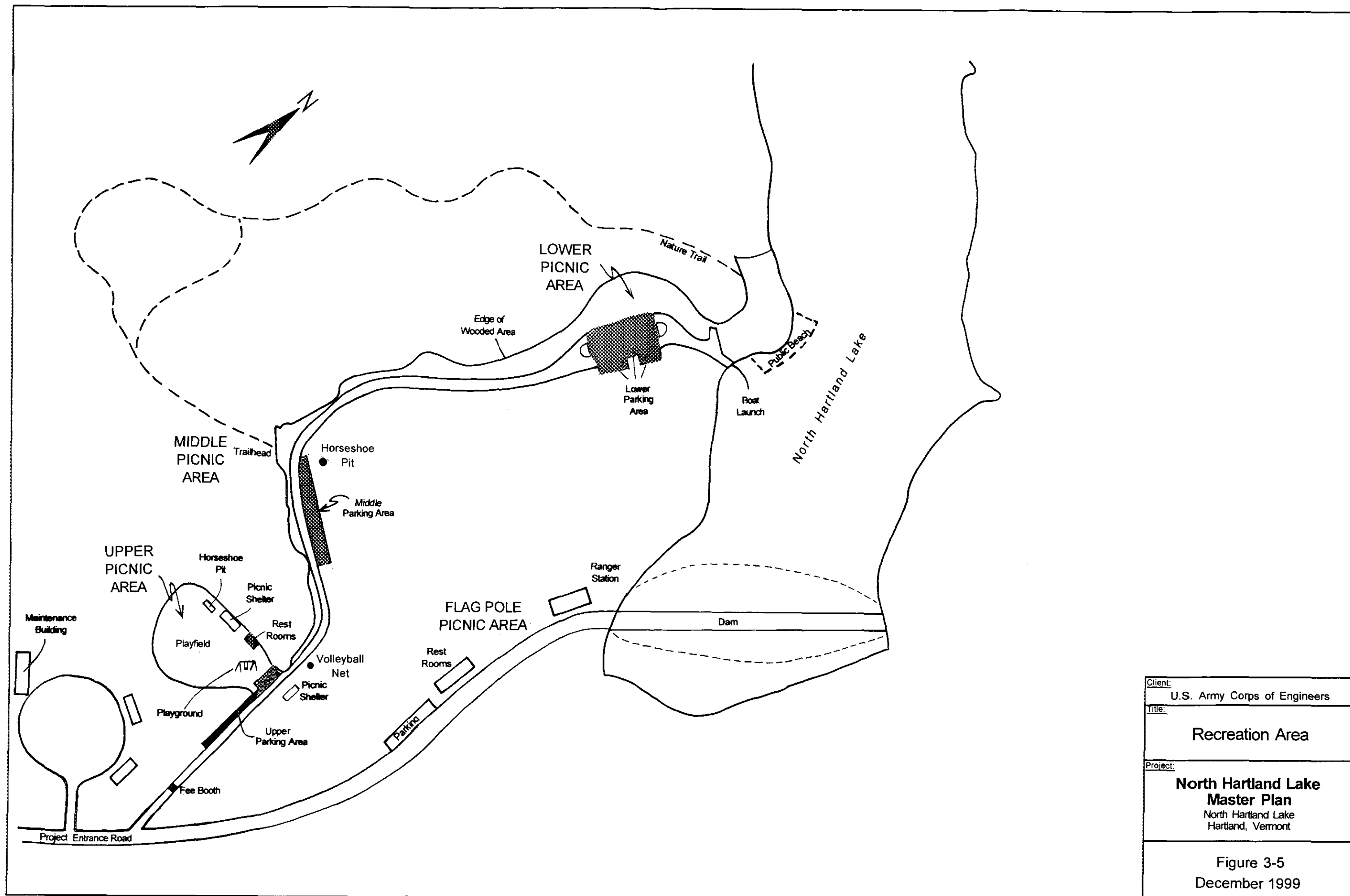
**Table 3-5
Regional Recreation Facilities within 30 Miles of North Hartland Lake**

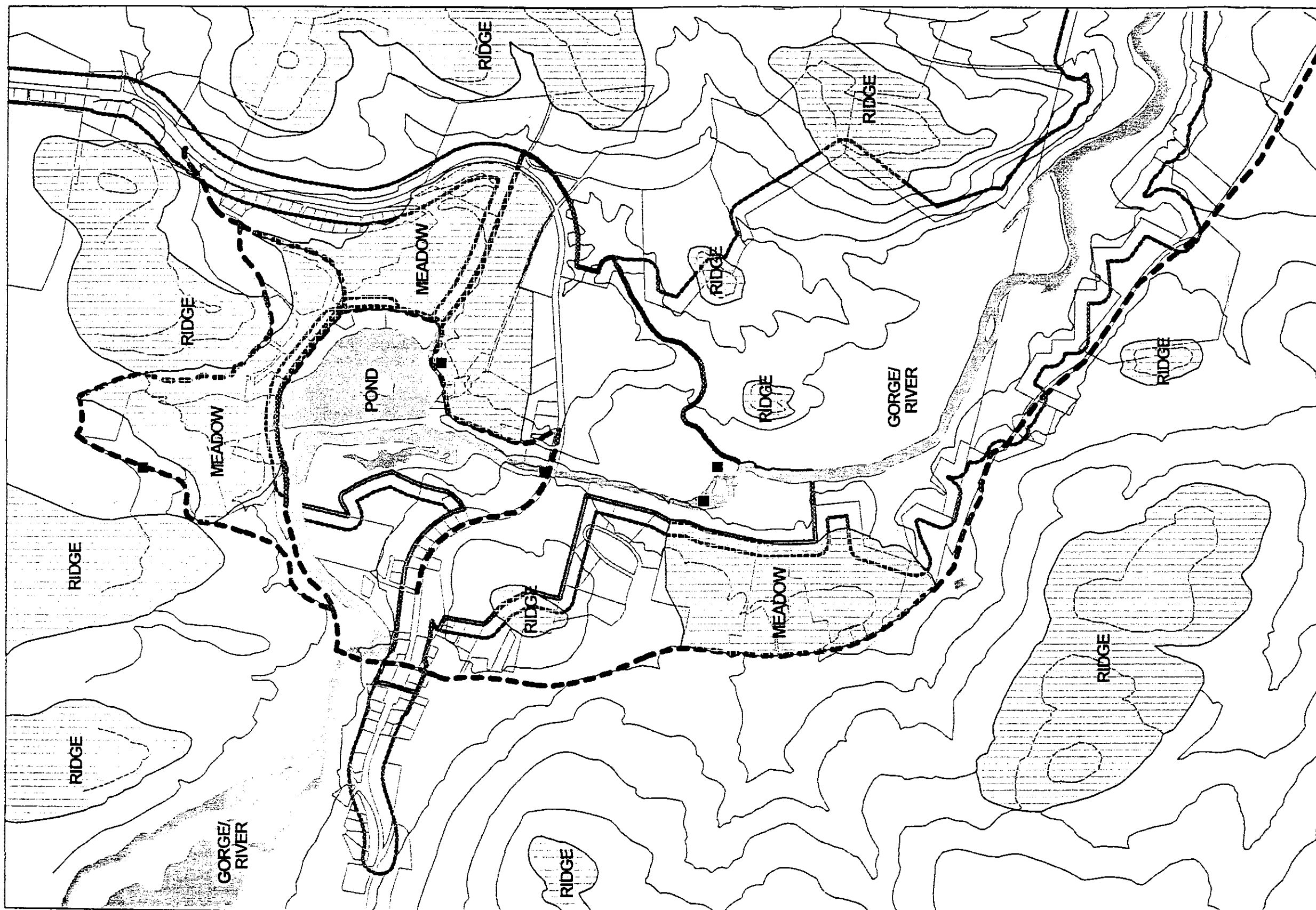
Area	Distance (miles)	Boating	Camping	Fishing	Hiking	Hunting	Picnicking	Ski-Touring	Snowmobiling	Swimming
FEDERAL										
N. Springfield Reservoir Area (VT)	25	x	-	x	x	x	x	x	x	x
Union Village Dam	26	-	-	x	x	x	x	x	x	x
Green Mountain National Forest (VT)	30	-	x	x	x	x	x	x	x	-
White Mountain National Forest (NH)	30	-	x	x	x	x	x	x	x	-
Marsh Billings Farm Nat'l Park (VT)	11	-	-	-	-	-	x	-	-	-
STATE PARKS										
Ascutney State Park (VT)	15	-	x	x	x	x	x	-	-	-
Gifford Woods State Park	30	-	x	x	x	x	x	-	-	-
Quechee Gorge State Park	7	-	x	x	x	x	x	-	-	-
Silver Lake State Park	19	x	x	x	x	x	x	-	-	x
Wilgus State Park	21	-	x	x	x	x	x	-	-	-
Plummers Ledge State Park (NH)	30	-	-	-	-	-	x	-	-	-
Wellinston Beach State Park	30	-	-	-	x	-	x	-	-	-
STATE FORESTS										
Calvin Coolidge SF (VT)	29	-	-	x	x	x	-	x	-	-
Calvin Coolidge SF - Camping Area	22	-	x	x	-	-	-	x	x	-
Calvin Coolidge SF - Day Use	25	x	-	x	-	-	x	-	-	-
Charles Downer SF	20	x	-	x	-	-	-	-	-	-
Okemo SF	30	-	-	-	x	-	-	x	x	-
Proctor-Piper SF	27	x	-	x	-	x	-	-	x	-
Thetford Hill SF	26	-	x	x	x	x	x	x	x	-
Annie Duncan SF	14	-	-	-	-	-	x	-	-	-
Connecticut River SF (NH)	30	-	-	-	-	x	-	-	-	-
Crosby Mt. SF	30	-	-	-	-	x	-	-	-	-
Hubbard Hill SF	29	-	-	-	-	x	-	-	-	-
Mascoma SF	21	-	-	x	-	x	x	-	-	-
Province Road SF	30	-	-	-	-	x	-	-	-	-
Province Road SF	26	-	-	-	-	x	-	-	-	-
Sentinel Mt. SF	30	-	-	-	x	x	-	-	-	-
Weiton Falls SF	30	-	-	-	x	-	-	-	-	-
OTHER STATE AREAS										
Amity Pond Natural Area (VT)	20	-	-	x	x	-	-	-	-	-
Ausel Pond Fishing Access	28	-	-	x	-	-	-	-	-	-
Black River Fish Access	29	-	-	x	-	-	-	-	-	-
Bragdon Nature Preserve	13	-	-	x	-	-	-	x	-	-
Justin Smith Morrill Homestead	24	-	-	x	-	-	x	-	-	-
Les Newell Wildlife Management Area	24	-	-	-	x	-	-	-	-	-
Tinker Brook Natural Area	29	-	-	-	x	-	-	x	-	-
Bog Pond Access (NH)	30	x	-	-	-	-	-	-	-	x
Butterfield Pond DRED	29	x	x	x	x	-	-	-	x	-
Cardigan Mt.	23	-	-	-	x	x	x	x	-	-
Clark Pond	24	x	-	x	-	-	-	-	-	-
Conn. River DPWH	9	x	-	x	-	-	-	-	-	-
Conn. River AC NHFG	9	-	-	x	-	-	-	-	-	-
Conn. River Marsh NHFG	15	-	-	-	-	-	x	-	-	-
Crystal Lake DPWH	19	x	-	x	-	-	-	-	-	-

Table 3-5
Regional Recreation Facilities within 30 Miles of North Hartland Lake

Area	Distance (miles)	Boating	Camping	Fishing	Hiking	Hunting	Picnicking	Ski-Touring	Snowmobiling	Swimming
Gile Forest	30	-	-	-	-	-	x	-	-	-
Halfmoon Pond DPWH	27	x	-	x	-	-	-	-	-	-
Indian Pond DPWH	30	x	-	x	-	-	-	-	-	-
Long Pond DPWH	28	x	-	x	-	-	-	-	-	-
Mascoma Lk, DPWH	18	x	-	x	-	-	-	-	-	-
McDaniel S Mash NHFG	27	-	-	-	-	-	-	x	-	-
Perkins Pond DPWH	29	x	-	x	-	-	-	-	-	-
Post Pond DPWH	22	x	-	x	-	-	-	-	-	-
Pleasant Pond DPWH	29	x	-	x	-	-	-	-	-	-
School Pond DPWH	29	x	-	x	-	-	-	-	-	-
Sculptured Rocks DPWH	28	-	-	-	x	x	x	-	-	-
Shaker Mt. Wld. Mgt. NHFG	23	-	-	-	-	x	-	-	-	-
Spectale Pond DPWH	30	x	-	x	-	-	-	-	-	-
Sunapee Wildlife Mgt. NHFG	30	-	-	-	-	x	-	-	-	-
Tewksbury Pond DPWH	28	x	-	x	-	-	-	-	-	-
Upper Baker Pond DPWH	18	x	-	x	-	-	-	-	-	-
Webster Wildlife Mgt. NHFG	16	-	-	-	x	-	-	-	-	-
TOWN AREAS										
Bragdon Nature Trail	12	-	-	x	-	-	x	-	-	-
Connecticut River Boat Access	16	x	-	-	-	-	-	-	-	-
Forest Park	7	-	-	-	x	-	x	-	-	-
Gile Mountain Recreation Area	20	-	-	-	x	-	-	x	-	-
Hartland Recreation Center	1	-	-	x	-	-	x	-	-	-
Lake Fairlee	25	-	-	-	-	-	x	-	-	x
Lake Morey Public Beach	25	x	-	-	-	-	-	-	-	x
Mill Park	12	x	-	-	-	-	-	-	x	-
Mount Peg Park	11	-	-	-	x	-	x	-	-	-
Mount Tom Park	11	-	-	-	x	-	x	-	-	-
Old City Falls	26	-	x	-	-	-	x	-	-	-
Paradise Park	12	-	-	x	x	-	-	-	-	-
Point Park	8	-	x	-	-	-	x	-	-	-
Treasure Island	25	x	-	-	-	-	-	-	-	x
Tug Mountain	30	-	-	-	x	-	x	x	-	-
Woodstock Recreation Center	11	x	-	-	-	-	-	-	-	x
Canaan Town Beach	24	-	-	-	-	-	-	-	-	x
Georges Mills	29	-	-	-	-	-	x	-	-	x
Groton Beach	30	x	-	-	-	-	-	-	-	x
Moody Park	25	-	-	-	x	-	x	-	-	-
Newport Nature Study Area	29	-	-	-	x	-	x	-	x	-
Orford Town Beach	30	-	-	x	-	-	x	-	-	x
Orford Town Beach, North	28	x	-	-	-	-	x	-	-	x
Pleasant Pond	29	x	-	x	-	-	-	-	-	-
Post Pond Beach	22	x	-	-	-	-	-	-	-	x
Rinker Track	18	-	-	x	x	-	x	-	-	-
School Pond	28	x	-	x	-	-	x	-	-	x
South Esker Park	10	-	-	-	x	-	x	-	-	-
Springfield Community Beach	27	-	-	x	-	-	-	-	-	x
Wentworth Town Forest	30	-	-	-	-	-	x	-	-	-

Source: U.S. Army Corps of Engineers, New England Division, 1981





Scale 1:18,000

Client:	U.S. Army Corps of Engineers
Title:	Scenic Assets
Source:	"Scenic Assets", Fig. 16, Quechee Gorge Public Lands Highway Study, Quechee, VT, by the LA Group, Saratoga Springs, New York
Project:	North Hartland Lake Master Plan North Hartland Lake Hartland, Vermont

Figure 3-6
December 1999

Beach/Boat Launch Area

The Corps maintains a 90- foot long (washed-sand) swimming beach along the southerly shore of North Hartland Lake. The swimming area is clearly marked with a float line and buoys. The beach area is contiguous to a larger grassed area that is used by visitors for sunbathing and for family outings (see Photo No. 3). Parking is provided within an easy walk to the beach area. The Corps charges a small fee to use this area.

Adjacent to the public beach area is a twenty-foot (20) wide paved boat launch. The use of watercraft, including motorboats, canoes, rafts, rowboats, kayaks and other vessels is permitted. All persons using watercraft are required to comply with applicable US Coast Guard, USACE and state regulations. The Corps charges a small fee per boat for using the boat launch. Personal watercraft, including jet skis, are not allowed.

Parking Areas

North Hartland Lake recreation area provides parking for 180 vehicles. The parking areas near the beach provide parking for vehicles and boat trailers. All parking areas are paved and striped. Parking is provided within four distinct areas as noted below, and as located on Figure 3-5.

<u>Location</u>	<u>No. of Spaces</u>
Flagpole Picnic Area	19 spaces (2 handicapped)
Upper Picnic Area	61 spaces (2 handicapped)
Middle Picnic Area	40 spaces (2 handicapped)
Lower Picnic Area	<u>60 spaces</u> (1 handicapped)
	180 spaces

The Corps has identified a need to expand the parking availability to meet demand especially during the summer months.

Flagpole Picnic Area

The flagpole picnic area is located on the left-hand side of the access road to the dam just before reaching the ranger station (Figure 3-5). This area includes the following.

- Five picnic tables
- One grill
- One fireplace

Upper Picnic Area

The upper picnic area is located across the beach access road from the playfield (see Appendix B, Photo No. 1 and Figure 3-5). This area includes two picnic shelters, restrooms with flush toilets, a playground, two horseshoe pits, a play field, a volleyball net and the following additional facilities.

- 24 picnic tables (eight inside small shelter plus two outside and 12 inside the large shelter plus two outside)
- Five grills (four large and one small)

Middle Picnic Area

The middle picnic area is situated at the trailhead on the beach access road (Figure 3-5). It contains two horseshoe pits and the following facilities:

- 19 picnic tables
- Seven grills
- Seven fireplaces

Lower Picnic Area

The lower picnic area located to the west of the beach parking area contains the 90-foot beach, a boat ramp, two porta-toilets and the following additional facilities (see Appendix B, Photo No. 2 and Figure 3-5).

- Five picnic tables
- Four grills (one large and three small)

Nature Trails

A self-guided interpretative trail starts at the middle picnic area and extends to the lower picnic area (Figure 3-5). The trail is $\frac{3}{4}$ mile long and offers 14 interpretive stations. The trail is used by hikers on a year-round basis and for cross country skiing and snowmobiling during the winter months.

Public Facilities

Two comfort stations are available for general public use at North Hartland Lake. Each side has one handicapped accessible toilet. The Corps also maintains two portable toilets at the lower picnic area during the summer season. A public telephone is located near the restrooms. The park presently has one drinking water fountain located near the large picnic shelter in the upper picnic area.

U.S. Army Corps of Engineers Operations

The flood control facility at North Hartland Lake is operated and maintained by the U.S. Army Corps of Engineers. The specific facilities include the dam structure and control tower, the intake and outlet tunnel, spillway and related structures required for the operation of the dam. A ranger station is located and staffed on the premises.

Other facilities located within this portion of the overall site include the access road (dike structure) and associated parking (21 spaces) and public restrooms.

Flood Control Pool and Dam

A permanent pool at elevation 425 feet NGVD is maintained on a year-round basis. It has a maximum depth of 35 feet and a net storage of 3,050 acre-feet. The size of the pool is approximately 215 acres. (ACOE, 1981). *This pool extends from the Quechee Gorge area south to the dam at North Hartland. This is the area that is used for fishing, boating and swimming on a seasonal basis.*

There are approximately 10 miles of shoreline within the study area, of which about half is considered accessible to anglers. The steep topography and limited trail access prohibits greater access to the shoreline other than by foot. North Hartland Lake offers a warm water fishery. The Vermont Agency of Natural Resources, Fish and Wildlife Department, stocks the lake with rainbow trout each spring.

The Corps offers tours of the North Hartland dam facility, by appointment, to learn about the operation of this flood control facility and to take advantage of the scenic vistas of the Ottauquechee River (see Appendix B, Photo No. 4). The rolled earthen dam is 1,640 feet long and offers a gravel path along the top of the facility for access to the control tower and for sightseeing.

3.4.2.2 Quechee Gorge Area

Scenic Overlooks

The natural features associated with the Quechee Gorge, Dewey's Mill Pond, North Hartland Lake and the surrounding countryside provide a valuable aesthetic resource that attracts over 500,000 visitors every year. The natural features that comprise this area include the steep gorge (164 feet deep), rock outcroppings, forested areas, rivers and ponds meadows and fields, farms and the rural tree lined byways as noted on Figure 3-6.

Views of the gorge from the U.S. Route 4 bridge are the most spectacular, affording panoramic views of the river valley and distant mountains (see Appendix B, Photo No. 5). Visitors to the area can also view the gorge and the Ottauquechee River from the gorge trail that runs along its eastern bank.

Trail System

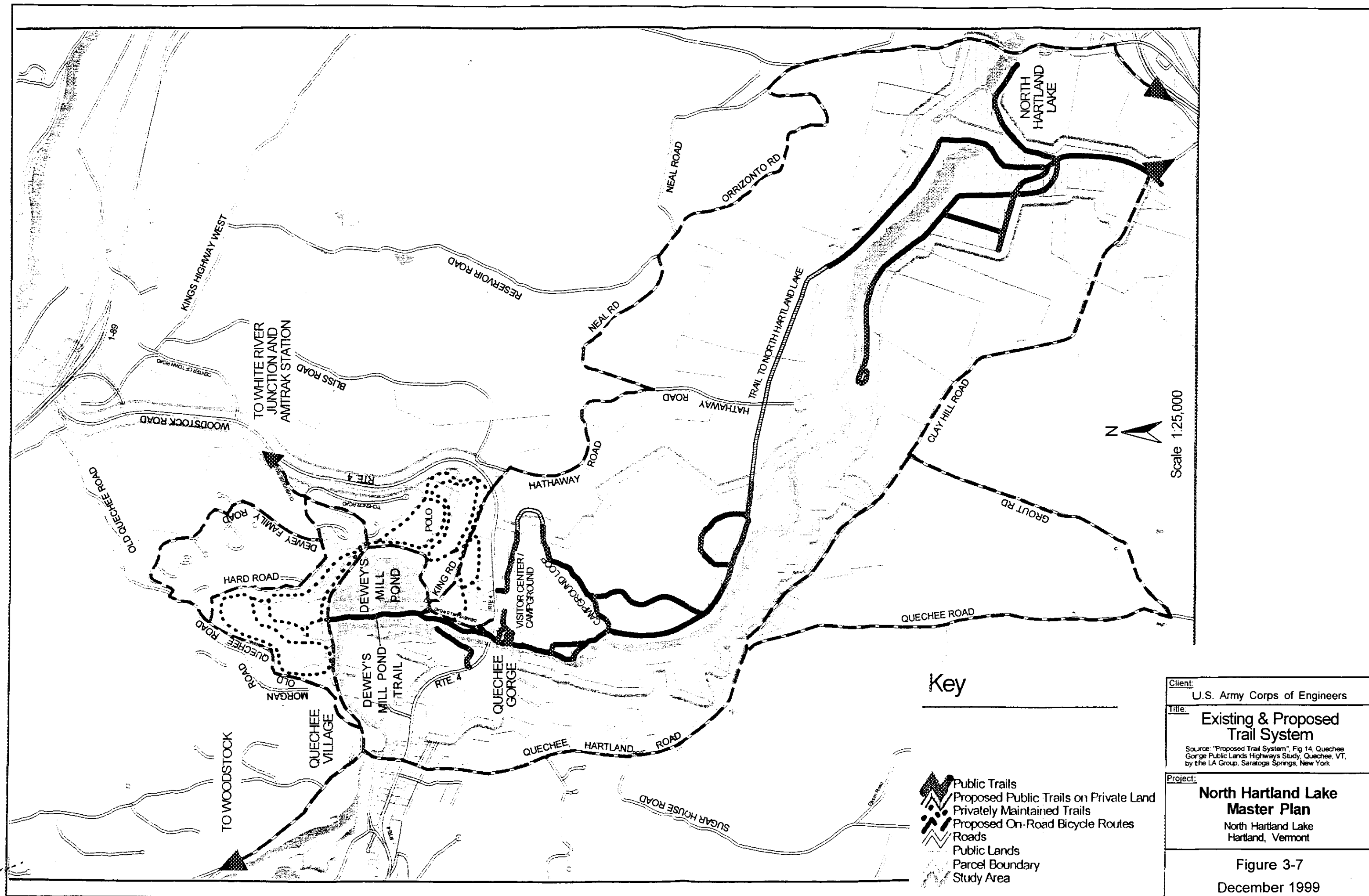
The project area offers hiking trails located on federal lands north and west of the Ottauquechee River (Figure 3-7). These trails are used throughout the year by hikers, cross-country skiers and snowmobilers (see Appendix B, Photo Nos. 6 and 7).

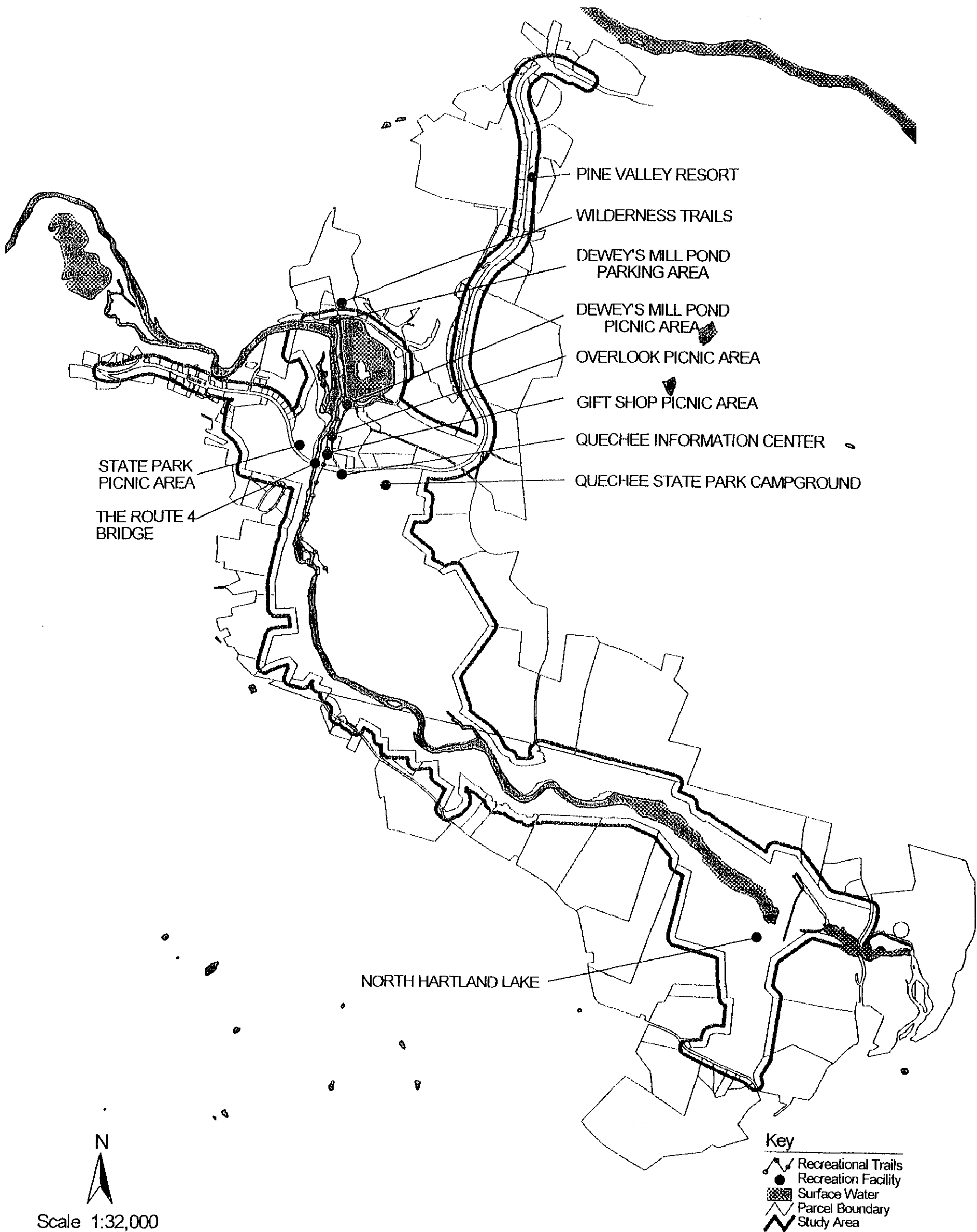
Quechee State Park

Quechee State Park is located off U.S. Route 4 just east of the Quechee Gorge in the town of Hartford (see Appendix B, Photo Nos. 8 and 9). This public campground, operated by the state of Vermont, Department of Forests and Parks, contains 48 campsites and 6 lean-tos, each equipped with its own picnic table and cooking grill. Additional facilities include hot showers, drinking water, sanitary facilities, a trash dumpster a recycling center and two playgrounds (see Figure 3-8). This 200-acre facility is leased from the federal government.

Recreational Activities

Visitors to the Quechee Gorge area have their choice of 4 picnic areas which offer 20 picnic tables, two campgrounds (one public and one private camping area), several parking areas located along U.S. Route 4 and extensive hiking trails.





Client:	U.S. Army Corps of Engineers
Title:	Quechee Gorge Recreation Area Inventory of Recreational Facilities
Project:	<p>Source: "Inventory of Recreational Facilities", Map 31, Quechee Gorge Public Lands Highway Study, Quechee, VT, by the LA Group, Saratoga Springs, New York.</p> <p>North Hartland Lake Master Plan</p> <p>North Hartland Lake Hartland, Vermont</p> <p>Figure 3-8</p> <p>December 1999</p>

Visitor Services

The Quechee Chamber of Commerce operates a small information booth off U.S. Route 4 near the Quechee State Park entrance. This booth provides information about the recreational and social activities within the project area including North Hartland Lake and the Quechee Gorge Area.

Commercial Interests

Visitors to the area are greeted by a variety of commercial activities located along U.S. Route 4 east of the bridge. While many of these commercial operations cater to the tourist trade, services for the local population are also available. A total of 43 commercial establishments were inventoried as part of the Quechee Gorge Public Lands Highways Study, Master Plan including retail operations, restaurants, lodgings, professional offices, personal services and essential services such as gasoline stations. A majority of these businesses are prospering from tourists stopping at Quechee Gorge and those that are passing through to other locations in Vermont.

3.4.2.3 Other Recreational Activities

Hunting and Trapping

Hunting and trapping are permitted on project lands in accordance with applicable federal, state and local laws except in areas designated by the New England District Engineer. White-tailed deer, ruffed grouse, and waterfowl are the principal game species

3.5 RECREATIONAL ANALYSIS

3.5.1 Existing Use

The facilities provided at North Hartland Lake have been primarily used by local residents given the fact that this is primarily a flood control site and it is not heavily promoted as a recreational destination. The numbers of people and length of stay at North Hartland Lake has increased over the years based on records kept by the Corps personnel. Tables 3-6 and 3-7 show the visitation statistics from 1993 to 1998. Sightseeing remains the primary recreational activity, followed by picnicking and camping, two activities which have increased since 1993. Visitor hours have increased by over 25 percent since 1993. Camping has more than doubled; picnicking and swimming have increased significantly. The visitation data is subject to change due to climatic conditions and the status of the local and regional economies.

The number of visitors using the state park has increased by 35% over this ten-year period. The State is planning to expand the campground and update its facilities to accommodate the demand for campsites

The Vermont Department of Forests and Parks indicated that the use of the campground is primarily visitors from the northeast, outside of Vermont, who generally stay one or two nights and then move on to other destinations in Vermont and Canada.

**Table 3-6
North Hartland Lake Visitation Data¹**

FY	Visitor Hours	Camping	Picnic	Boat	Fish	Hunt	Swim	Sight-seeing	Winter Sports	Other ⁽²⁾
FY 1998	982335	23261 35.06%	9064 23.96%	41 0.11%	193 0.5%	59 0.16%	7150 18.9%	19640 51.92%	100 0.26%	3100 9.20%
FY 1997	1002779	13100 20.3%	21650 33.6%	95 0.2%	465 0.7%	171 0.3%	17057 26.5%	39739 61.7%	63 0.1%	7322 11.4%
FY 1996	995295	11967 11.5%	25754 24.8%	112 0.1%	590 0.6%	276 0.3%	20235 19.5%	77696 74.7%	628 0.6%	8994 8.6%
FY 1995	999332	12410 16.6%	27679 37%	119 0.2%	541 0.7%	109 0.2%	21890 29.2%	47630 63.6%	121 0.2%	9357 12.5%
FY 1994	950047	11264 8.8%	13922 10.9%	157 0.1%	684 0.5%	93 0.1%	6649 5.2%	106104 83%	293 0.2%	1682 1.3%
FY 1993	785504	9715 17.2%	3039 5.4%	46 0.1%	859 1.5%	45 0.1%	2202 3.9%	43219 76.7%	77 0.1%	942 1.7%

Source: U.S. Army Corps; N.E. District, VERS Report

Notes:

1. All visitation data (numbers) based on traffic counters located on the access road leading to North Hartland Lake.
2. Other activities not previously mentioned (i.e., walking)

Table 3-7 below shows the visitation data for Quechee State Park provided by the Vermont Department of Forests and Parks over the past ten years.

Table 3-7
Quechee State Park Visitation Data

YEAR	NUMBER OF VISITORS
1997	13,200
1996	14,100
1995	13,000
1994	11,000
1993	11,300
1992	11,100
1991	10,300
1990	9,400
1989	9,800
1988	8,800
1987	9,700

Source: Vermont Department of Forests and Parks

3.5.2 Natural and Scenic Qualities

Visitors are attracted to the area by the diversity of geologic and natural features that were formed in this area. The Ottauquechee River, Dewey's Mill Pond, North Hartland Lake, the dam, Quechee Gorge and the rural landscape provide an abundance of scenic assets. The U.S. Route 4 bridge that spans the Quechee Gorge offers a unique vantage point for viewing of the river, gorge and distant views of forests, and mountains.

A walk down the Quechee Gorge Trail from U.S. Route 4 provides a variety of natural and scenic views including the geologic formation of the gorge, rushing waters and forested areas.

3.5.3 Projected Use

The primary concern of the local communities within the region is the preservation of its natural, cultural and scenic resources. Preserving the rural environment, through the proper control of development, consideration for the natural, recreational and open space resources, and maintaining the working landscape are considered high priorities for the region according to the Vermont Open Space Plan (SCORP) dated 1993.

With a strong economy, generally, people have more disposable income and take additional time to vacation. The scenic Quechee Gorge area will continue to attract visitors from other parts of the country, principally from New England and the Mid Atlantic area. The recreational facilities including the trail system, the beach at North Hartland Lake and the variety of picnic areas will attract local Vermont residents primarily for day use and occasionally overnight stays at the campground. Although a majority of visitors using Quechee State Park are from out-of-state.

The growth in the regional population base is projected to increase by 12 percent in Windsor County and 35 percent in Orange County in Vermont (Table 3-8). The New Hampshire study area is also projected to increase by 6 percent in Sullivan County and 12 percent in Grafton County.

Local Needs

The project area falls within the political jurisdictions of Hartland and Hartford. The following is a list of recreational needs that were derived from local plans and through public meetings.

- Increase water-based recreation opportunities
- Expand the trail system and interpretive programming for hikers
- Determine the feasibility of designing a path for biking and in-line skating along existing local roads.
- Provide increased opportunities for active recreational activities including basketball, tennis, and playgrounds

Regional Needs

Based on information compiled by the Upper Valley Lake Sunapee Regional Planning Commission (UVLSRPC) the recreational needs of the region are as follows:

- Provide additional recreation corridors for trail uses such as hiking, bicycling, snowmobiling, cross-country skiing and horseback riding
- Expand the availability of picnic areas
- Increase access to water resources, especially to the Connecticut River and lakes and ponds
- Increase the number of public beaches
- Provide additional public lands for general recreation activities

**Table 3-8
Regional Population Projections**

Location	1990	1995	2000	2015	Percent Change 1990- 2015
VERMONT					
<i>Windsor County</i>	34626	36048	36937	38880	12%
Hartford	9404	9930	10310	11210	19%
Hartland	2988	3261	3485	4136	38%
Bridgewater	895	888	867	778	-13%
Woodstock	3212	3214	3168	2840	-11%
Windsor	3714	3471	3176	2351	-36%
Norwich	3093	3365	3588	4311	39.38
Pomfret	874	901	913	880	69%
Barnard	872	922	957	1007	15.5%
Norwich	3093	3365	3588	4311	39%
Royalton	2389	2591	2754	3086	29.18
Sharon	1211	1440	1647	2450	102%
Plymouth	440	465	484	506	15.00
W. Windsor	923	998	1058	1215	31.64
Reading	614	596	571	471	-23.29
Cavendish	1323	1281	1222	1015	-23.28
Weathersfield	2674	2725	2737	2624	-1.87
<i>Orange County</i>	3340	3609	3863	4506	34.91%
Strafford	902	981	1056	1292	43.24
Thetford	2438	2628	2807	3214	31.83
NEW HAMPSHIRE					
<i>Sullivan County</i>	26389	26308	26538	27855	5.56%
Claremont	13902	13296	13057	13027	-6.72
Cornish	1659	1689	1723	1891	13.98
Croydon	627	636	649	713	13.72
Grantham	1247	1539	1835	2310	85.24
Newport	6110	6010	5853	5952	-2.7
Plainfield	2056	2215	2363	2675	3.01
Springfield	788	923	1058	1287	63.32
<i>Grafton County</i>	30838	31240	32137	34543	12.01%
Canaan	3045	3243	3501	3983	30.80
Enfield	3979	4273	4626	5287	32.87
Grafton	923	991	1076	1235	33.80
Hanover	9212	8980	8978	9093	-1.3
Lebanon	12183	12243	12443	13235	8.63
Lyme	1496	1510	1513	1710	14.30

Source: Vermont Population Projections (1990-2105) Vermont Health Care Authority, June 1993.

3.5.4 Carrying Capacity

The carrying capacity of the North Hartland Lake Recreation Area is constrained by the size of the beach and the limitations on availability of picnic shelters and parking. North Hartland Lake staff report, that on hot summer days, the demand for beach space significantly exceeds the area provided by the existing 90-foot long beach. Onsite staff also report having to turn away as many as 10-15 large parties a year that wish to utilize the picnic shelters. In addition, there is an observed need to provide interpretive services at the Upper Picnic Area, and ranger oversight and management of the three recreational sites located in the North Hartland Lake Recreation Area. In addition to current recreational demand exceeding supply, the demand for recreational facilities is projected to increase by 12 percent by 2015, in line with regional population projections for Windsor County.

North Hartland Lake personnel have estimated that enlarging the beach area, and providing an additional large picnic shelter would assist in accommodating peak demands at the recreation area. Additional parking area would also be required to serve these facilities.

3.5.5 User Conflicts

The North Hartland Lake property covers 1,464 acres of land with access limited to the dam at North Hartland Lake and the vicinity of the Gorge and Quechee State Park.

The project area provides a variety of active and passive recreational opportunities throughout the year. These activities include: hiking, snowmobiling, cross-country skiing, sightseeing, camping, fishing, boating, hunting, trapping, swimming, sunbathing, ball playing, picnicking and enjoying the great outdoors.

The only major use conflict observed is the following:

Vehicular and Pedestrian Use of the U.S. Route 4 Bridge

While pedestrian access to the bridge is controlled by a metal divider and traffic moves slowly over the bridge, especially during the peak seasons, the bridge remains a dangerous situation for visitors hoping to catch a glimpse of the Quechee Gorge. The Quechee Gorge Public Lands Highways Study, Master Plan (commonly known as the Quechee Gorge Master Plan) has addressed this issue and has developed a series of alternatives, including the possible construction of an underbridge catwalk that would be used solely by pedestrians. Bicyclists would not be allowed to cross it.

4.0 PUBLIC INVOLVEMENT AND COORDINATION

Coordination with elected officials, other agencies, and the public was conducted as part of the planning process. Public coordination was initiated with the issuance of a Public Notice May 13, 1998, and a News Release on May 13, 1998. These documents announced the initiation of the study, solicited input, and resulted in several letters from interested agencies and individuals concerning the Study (see Appendix A).

Workshop meetings were held with state and local officials during the study. These included the following:

- Meeting and site inspection of facilities with the Vermont Department of Forests, Parks and Recreation on May 20, 1998;
- Two workshops with local, regional and state officials June 18, 1998;
- Meeting with the Town of Hartland Conservation Commission on July 1, 1998;
- Meeting with the Town of Hartford Conservation Commission on July 6, 1998

In addition to the above workshop meetings, a formal public meeting was held on June 23, 1999.

The above meetings resulted in the following public comments and desires:

1. Concerned that any expansion of facilities would change the character and quality of the area.
2. Support expansion of North Hartland Lake Beach Area for use by local residents.
3. Avoid connection of Quechee Gorge Area to North Hartland Lake Recreation Area. These areas provide opportunities to two distinct user groups: the first one to regional and transient users and the second to local residents.
4. Place horsepower limits on motorized boats.
5. Encourage continued vegetative and other management activities to enhance fish and wildlife resources.
6. The project area should remain in a natural state with continued access for hunting and fishing.
7. Improve signage and expand interpretive programs, especially for the local communities.
8. Continue to coordinate and expand, as appropriate, recreational programs with local recreation departments and youth groups, such as Junior Ranger, Junior Naturalist and Scouting programs.
9. Develop volunteer trail maintenance program.
10. Support implementation of the Quechee Gorge Master Plan.
11. Minimizing traffic on Clay Hill Road.

5.0 RESOURCE MANAGEMENT OBJECTIVES

The following natural, recreation and cultural resource management objectives were prepared from information provided by the New England District, Vermont Department of Forests and Parks and through public meetings held within the Towns of Hartland and Hartford. Resource objectives have been developed to guide future design, development and management of the resource base, natural and manmade, to obtain the greatest possible benefit through meeting the needs of the public and protecting and enhancing environmental quality.

5.1 NATURAL RESOURCES OBJECTIVES

The following are a series of natural resources goals and objectives that have been developed through public meetings and needs identified by the USACE as steward of the property.

1. Provide for the management of all natural resources associated with the project to include the protection and preservation of rare, threatened and endangered species, the harvesting of timber resources, the protection of water quality, and the implementation of programs to manage invasive, non-native species.
2. Enhance and protect fish and wildlife habitat for native, indigenous species through the use of various woodland, wetland, and open land management programs.
3. Monitor wildlife species and their habitat within the project limits.
4. Promote and evaluate public use of the natural resources of the project to include hunting, trapping, fishing, and viewing. Support the state fish stocking program, and efforts to establish a warm water fishery.
5. Protect and conserve wetlands, and rare plants and animal habitats such as vernal pools, from detrimental activities.

5.2 RECREATIONAL RESOURCES OBJECTIVES

The following are a series of recreational goals and objectives that have been developed through public meetings and needs identified by the USACE as steward of the property.

1. Provide for the continued maintenance and growth of recreational opportunities (infrastructure, programs, etc.) with input from the local community.
2. Maintain and improve the Interpretive Services and Outreach Program to enhance the public's understanding and appreciation of the role of the Corps of Engineers in the administration and management of North Hartland Lake.
3. Provide for the continuance of activities associated with fish and wildlife resources.
4. Maintain existing trails on project lands.
5. Identify, develop, and promote trails on project lands in accordance with natural resources objectives.
6. Evaluate boating use at North Hartland Lake, and determine the need to establish horsepower limits.
7. Support the Quechee Gorge Master Plan that includes a new visitor center, improved visitor access to the Gorge, and traffic control along Route 4.

5.3 CULTURAL RESOURCES OBJECTIVES

1. Protect known and documented prehistoric and historic archaeological sites. Measures may include, but not be limited to:
 - a. Avoid known sites, if possible. If resources cannot be avoided, every effort should be made to minimize these impacts. If impacts to significant resources are unavoidable, then further archaeological investigations may be required prior to implementation. In all cases, development activities should be reviewed by a Corps staff archaeologist and may require coordination with the Vermont State Historic Preservation Officer (VT SHPO).
 - b. Monitor the project area for evidence of unauthorized excavation or collection of cultural resources and damage to sites. Known sites should be maintained and preserved as important project resources.
2. Consult with the Corps archaeologist prior to any development or disturbance on Corps' property.
3. Support interpretative programs for historic and archaeological resources, where appropriate and in accordance with federal laws and directives.

6.0 LAND ALLOCATION AND CLASSIFICATION

6.1 LAND ALLOCATION

Lands at North Hartland Lake were acquired for flood control purposes, therefore, all project lands are allocated to the Operations category.

6.2 LAND CLASSIFICATION

In accordance with the U.S. Army Corps of Engineers regulation, ER 1130-2-550 and pamphlet, EP 1130-2-550, these allocated project lands are further classified to provide for development and resource management consistent with authorized project purposes, and the provisions of the National Environmental Policy Act (NEPA) and other federal laws. Land classification categories are described below and as noted in Figure 6-1.

- Multiple Resource Management – Land managed for one or more of, but not limited to the following activities.
 - a. Low Density Recreation – Activities such as hiking, primitive camping, wildlife observation, hunting or similar low density recreational pursuits.
 - b. Wildlife Management General – Fish and wildlife management activities.
 - c. Vegetative Management – Management activities for the protection and development of forest and vegetative cover.
 - d. Inactive and/or Future Recreational Areas – Recreation areas planned for the future or temporarily closed.
- Project Operations – This classification includes land required for flood control structures, administration and maintenance facilities.
- Recreation – Land developed for intensive recreational activities by the visiting public.
- Mitigation – This includes land acquired or designated specifically for mitigation. No land areas at North Hartland Lake are classified in this category.
- Environmentally Sensitive Lands – Areas where scientific, ecological, cultural or aesthetic features have been identified.

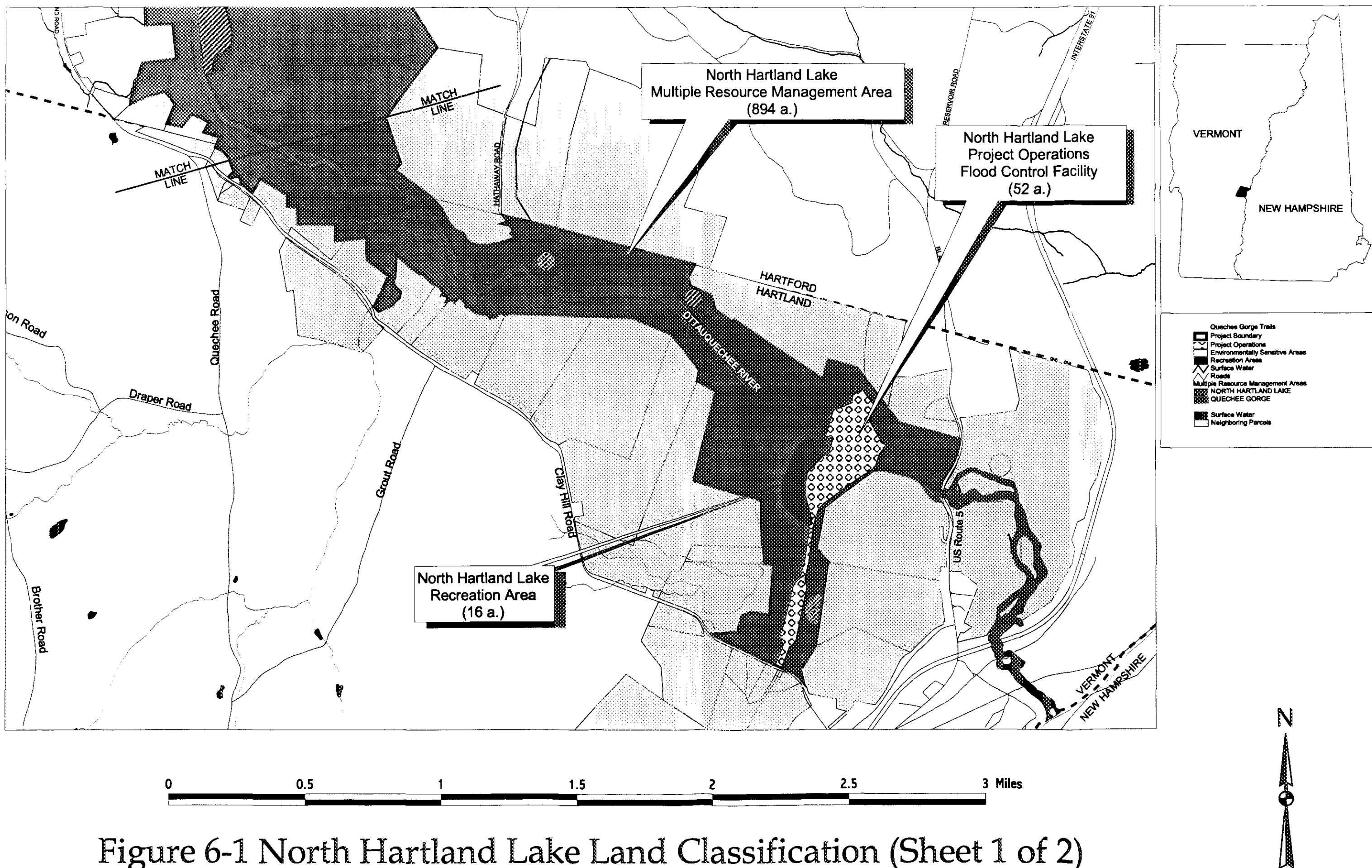


Figure 6-1 North Hartland Lake Land Classification (Sheet 1 of 2)

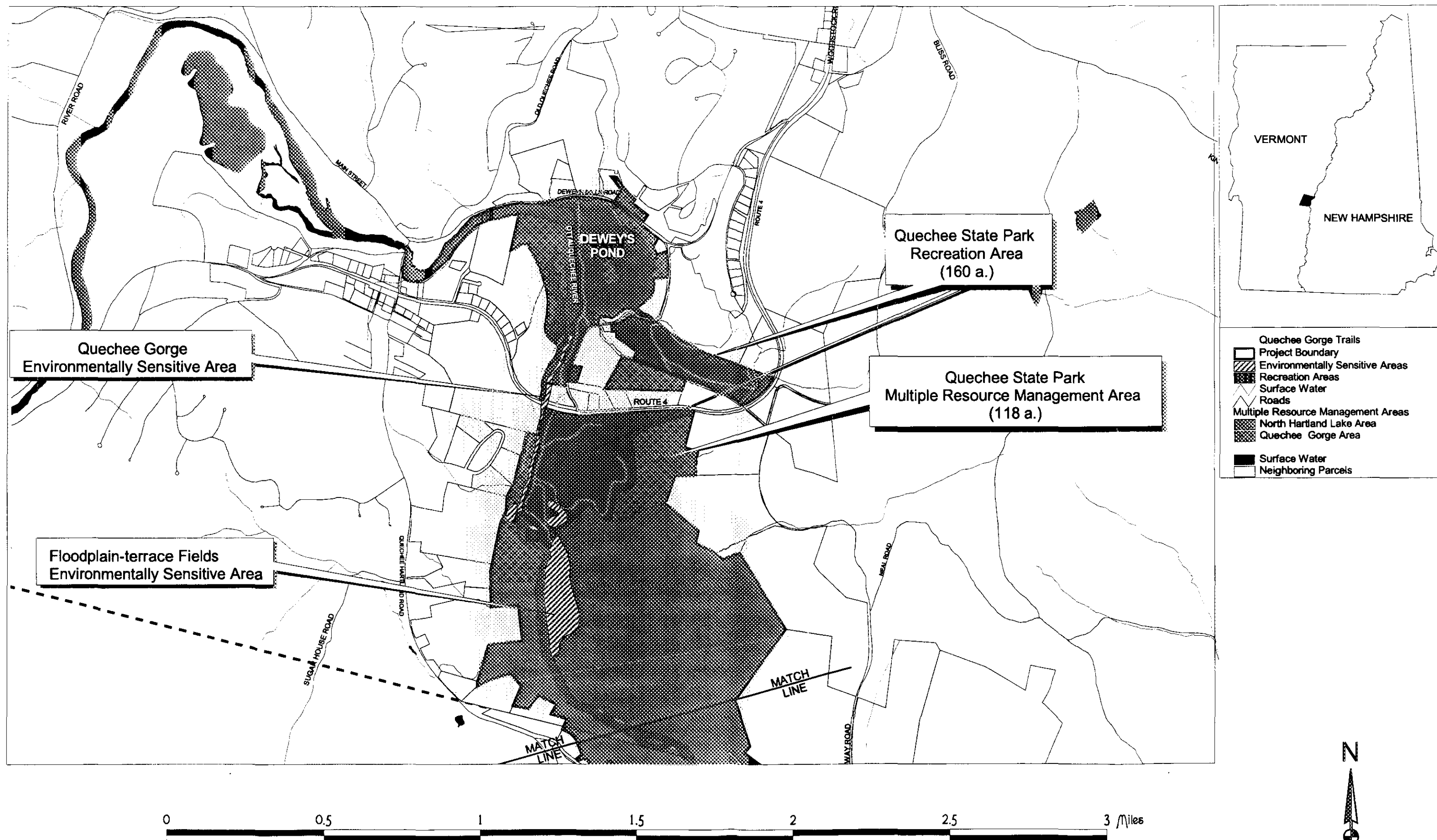


Figure 6-1 North Hartland Lake Land Classification (Sheet 2 of 2)

- Easement Lands – All lands for which the USACE holds an easement interest but not fee title.

The following information will describe the classification of land within the bounds of the North Hartland Lake Project. Previous sections concerning the project area including purpose, natural and recreational resources and development constraints and opportunities provided the basis for this land classification (Figure 6-1).

6.2.1 Multiple Resource Management

A significant portion of the North Hartland Lake can be characterized as multiple resource management areas, totaling approximately 800 acres of land. These resources include surface waters, (Ottauquechee River), wetlands, forested areas, fields and low intensity recreational areas. A general description is as follows.

- Low Density Recreation – Lands allocated for low density recreation activities include areas suitable for widely spaced recreation activities requiring few, if any facilities. Suitable activities include fishing, canoeing, hunting, trapping, hiking, ski-touring, snowshoeing and snowmobiling.
- Wildlife Management General– The areas surrounding the Ottauquechee River, forested area and open fields provide excellent habitat environments for a variety of wildlife including, but not limited to white-tailed deer, eastern bluebird, ruffed grouse and wood duck. These areas are subject to protection under state and federal environmental laws. Lands managed for the enhancement of resident and migratory wildlife species are designated for wildlife management. These lands may also be used for low-intensity recreation activities as long as they do not interfere with wildlife management.

6.2.2 Project Operations

The Corps operates and maintains the North Hartland Lake flood control facility to ensure the protection of life and property downstream of the dam structure. They maintain a permanent pool on the north side of the dam at elevation 425. The Corps has flowage easements totaling 248 acres, over adjoining lands along the Ottauquechee River.

The facilities that are maintained by the Corps park rangers at North Hartland Lake include the spillway, intake and outlet tunnel, operations office, dike, debris field, access roads, and surrounding area.

6.2.3 Recreation

Lands that are allocated for intensive recreation in the southern part of the site are associated with the North Hartland Lake recreation area. The developed recreation area includes picnic shelters and tables, open lawn areas, beach, boat ramp area, and restroom building. Activities include picnicking, camping, swimming, hiking and boating. Open areas are maintained as play fields. The amount of land area allocated for recreation is approximately 16 acres, 8 acres of which is open lawn areas, with the remainder forested.

The northern portion of the North Hartland Lake project is comprised of the land leased to the state of Vermont, Department of Forests and Parks and forested areas adjoining the Quechee Gorge. This area contains approximately 612 acres of which approximately 400 acres are forested. The Quechee State Park Campground is located off U.S. Route 4 east of Quechee Gorge. The State Park offers 48 tent/trailer sites, 6 lean-to sites and two bathrooms and receives intensive use on a seasonal basis. Other facilities associated with the State Park include a sanitary dump station, a large field and two playgrounds. The park is open from mid-May to mid-October and receives its highest use during the summer (July-August) season.

6.2.4 Environmentally Sensitive Lands

Several locations within the project site constitute areas of scientific, ecological, cultural, or aesthetic value. The oak-pine forest and rich northern hardwood forest (see Section 3.2.6) are examples of locally-significant natural communities due to their vegetative composition and age structure. The emergent riparian marsh and floodplain meadow terraces (also described in Section 3.2.6) are especially valuable as exemplary wildlife habitats. Other areas within the project classified as providing scientific or ecological value include Quechee Gorge and the individual sites for rare plant and animal species identified in the Vermont Natural Heritage report of 1996.

Areas of particular aesthetic value at the site include Quechee Gorge and the timbered ridges upslope of the Ottauquechee River and North Hartland Lake. Those areas identified as having cultural resource value include the prehistoric and historic sites documented in the vicinity of Dewey's Mill Pond and along the banks of the Ottauquechee River. However, the exact location of these cultural resources is not shown on Figure 6-1 as a protective measure.

7.0 RESOURCE DEVELOPMENT PLANS

7.1 NATURAL RESOURCES

The New England District has identified the following items through the master planning process:

1. Construct a wildlife viewing platform at an appropriate location within the project area.
2. Construct a new ranger station and interpretive center. Based on estimated space requirements, *a building of approximately 12' x 24' would be needed. This is estimated to cost \$7,000.*

7.2 RECREATIONAL RESOURCES

The following is a list of actions for improving recreational facilities and activities within the project area (see Figure 7-1).

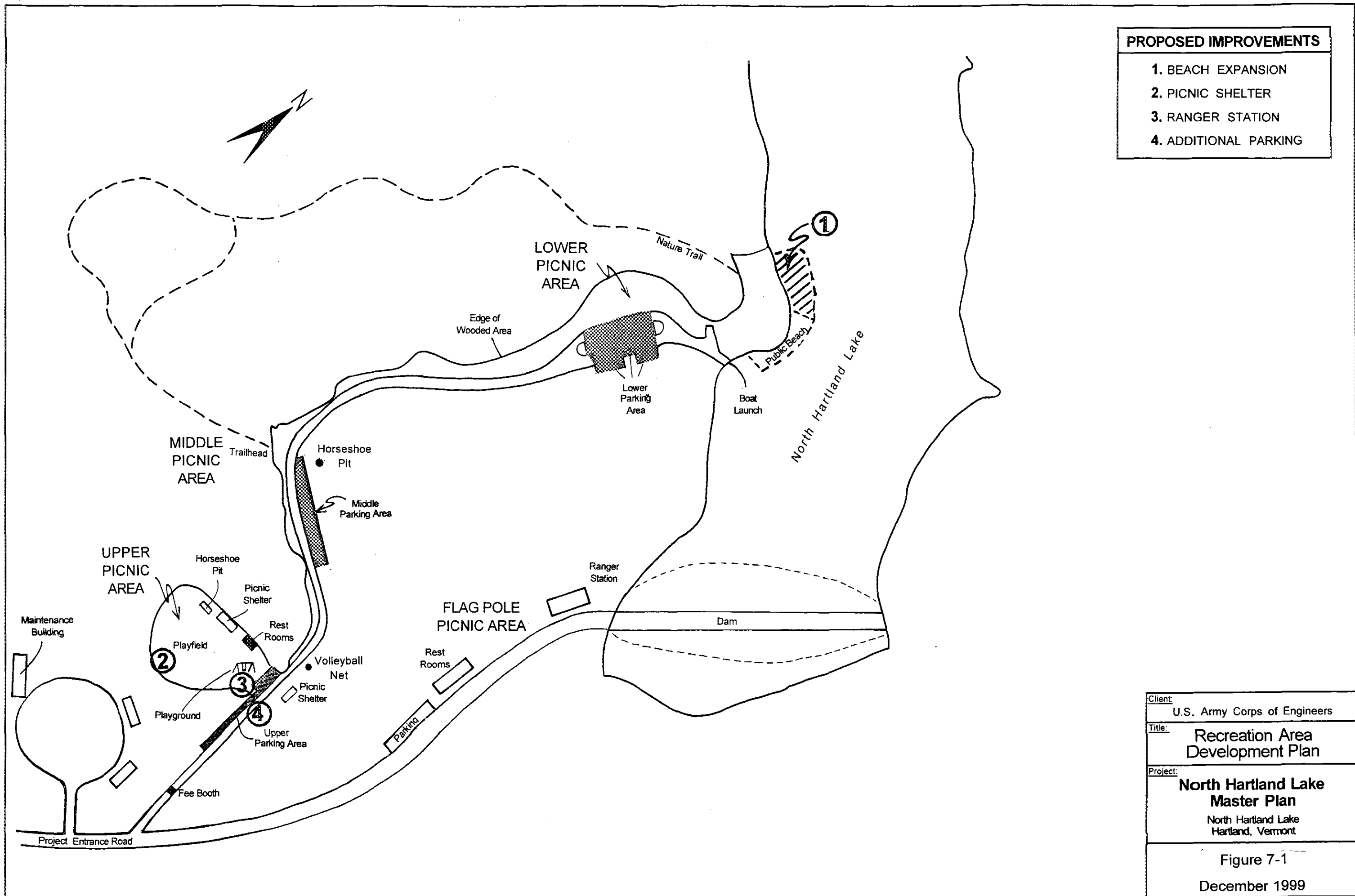
1. Construct an additional picnic shelter at the upper picnic area. A shelter of approximately 30' x 40' is estimated to cost \$25,000.
2. Add up to 90 feet of frontage to the North Hartland Beach based upon available funding. The 90-foot extension of the beach is estimated to cost \$3,000.
3. Provide for an additional parking area to accommodate a minimum of 30 vehicles just inside of the fee booth on the right side. Approximately 9,000 square feet of parking is estimated to cost \$20,000.

The results of a study of Clay Hill Road traffic will be evaluated and considered before the above recreational improvements are implemented.

4. Install signage along Route 4 directing North Hartland Lake visitors easterly to Route 5 then southerly to Clay Hill Road. Signs would also be required along Route 5 northbound prior to its intersection with Clay Hill Road.

The intent of these signs is to minimize traffic on Clay Hill Road in response to concerns expressed by the Town of Hartland.

The visitor center and other improvements proposed in the Quechee Gorge Master Plan will require specific proposals for Corps review and approval.



8.0 CONCLUSIONS

This Master Plan provides guidance for future development at North Hartland Lake. The natural and man-made resources at the project will continue to be managed to provide the best combination of responses to regional and ecosystem needs, project resources and capabilities.

Natural and man-made resources have been identified and analyzed. These included wetlands, exemplary natural communities and cultural resources, which require specific management efforts for their protection. Recreational opportunities were identified through an analysis of regional needs and expressed public desires.

Through land use classification, the Master Plan has designated areas for project operations, recreation, environmentally sensitive lands and multiple resource management. About 52 acres in the vicinity of the dam will continue to be reserved for project operations. The North Hartland Lake recreation area parcel (16 acres, 8 of which are cleared open space), and the campgrounds of Quechee State Park (160 acres), have been classified as intensive recreation. The existing lease for the State Park, as well as for other outgranted parcels, are expected to be renewed. The remaining areas have been classified as multiple resource management areas (894 acres at North Hartland Lake and 118 acres at Quechee State Park).

The Master Plan has identified recreational opportunities through an analysis of regional needs, and the public participation process. This planning process identified opportunities for the improvement of existing recreational facilities, enhancement of boat and beach facilities, picnic areas and playfields, and multiple resource management to enhance and protect important natural and cultural resources. Enhancing and preserving the resources by careful management of user conflicts was also identified. Other opportunities include establishing trails to tie into community proposals such as the Quechee Gorge Study or other cross-state bike and hiking trails.

All specific proposals for recreational development or natural resources management at the project must comply with this Master Plan, the Connecticut River Basin flood control requirements, and the National Environmental Policy Act and federal requirements.

9.0 RECOMMENDATIONS

It is recommended that the North Hartland Lake Master Plan be approved as a guide to the North Hartland Lake flood control project. Approval of this Master Plan would rescind Design Memorandum, Project Plan for Recreation Resources Development, dated 1981.

Appendix A

Pertinent Correspondence

State of Vermont

Department of Fish and Wildlife
Department of Forests, Parks and Recreation
Department of Environmental Conservation
State Geologist
Natural Resources Conservation Council



AGENCY OF NATURAL RESOURCES
DEPARTMENT OF FISH AND WILDLIFE
State Wildlife Laboratory
Roxbury, Vermont 05669
Telephone Number: 802-485-7566

June 21, 1999

Richard Heidebrecht
U.S. Army Corps of Engineers
New England Division
696 Virginia Road
Concord, Massachusetts 01742-2751

Re: Draft Master Plan, North Hartland Lake

Dear Mr. Heidebrecht:

I have reviewed the draft plan for the above referenced project and offer the following comments regarding fisheries resources:

Section 3.2.6 refers to the poor condition of the fisheries in North Hartland Lake despite repeated attempts to manage for both coldwater fisheries (primarily "put-and-take" for rainbow trout) and warmwater fish species (largemouth bass). The draft plan infers that the extreme water level fluctuations may have been the main factor limiting fish production, and, as a result the Corps has maintained a stable water level throughout the year at elevation 425 NGVD. The reference to a stable water level is mentioned several times throughout the draft (e.g. 3-31 line 745), and is misleading. Compared to natural systems water level fluctuations continue to be extreme. Table 2.2 shows drastic increase in pond elevations 30 times during the 19 year period from 1980 through 1998. Additionally the pond elevation is lowered nearly every year if not every year in order to clean up the debris at the swimming and boat launch areas.

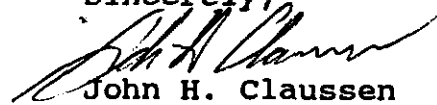
Also with respect to the erroneous reference to existing stable water levels, Section 3.2.6 lines 485,486 state: "An evaluation needs to be conducted to determine the current conditions of the fishery". A recent fisheries and water quality investigation ("Lakewatch") has been conducted by your own Environmental Resources Section in 1998. One of the comments in the Lakewatch report regarding the lack of largemouth bass reproduction states: "One possible (partial) explanation for this could be the annual drawdown of the reservoir level during May to replenish the swimming beach. This drop in water level could expose the nests of the spawning bass, since May is generally the beginning of Largemouth (sic) bass spawning season in this area. Fluctuating

water levels are detrimental to Largemouth (sic) bass spawning."

I recommend you included the relevant findings from your recent Lakewatch water quality and fisheries investigations in the Master Plan for North Hartland Lake.

Thank you for the opportunity to review and comment on the draft plan.

Sincerely,

A handwritten signature in cursive script, appearing to read "John H. Claussen".

John H. Claussen
District Fisheries Biologist



CONNECTICUT RIVER WATERSHED COUNCIL
Protecting the Connecticut River Since 1952

UPPER VALLEY OFFICE: P.O. Box 206, Saxtons River, VT 05154
PHONE: 802/869-CRWC FAX: 802/869-2137 NH 603/675-2518 EMAIL: crwc@sover.net

Colonel Michael W. Pratt
696 Virginia Road
Concord, NH 01742-2751

July 9, 1999

Re: Environmental Assessment Master Plans on Flood Control Projects


Dear Colonel Pratt:

I would like to receive the draft Master Plans for the following Corps facilities: Union Village Dam, Thetford, VT; North Springfield Lake, Weathersfield, VT; Surry Mountain Lake, Surry, NH; and the Edward MacDowell Lake, Peterborough, NH. I already have a copy of the plan for North Hartland.

In addition to the plans I would like to receive the flow records for the last 30 days at each of these facilities and any permit requirements that establish minimum flow levels at each of the facilities. Please send the requested information to the above address.

In order for CRWC to comment on these plans I will need to receive them quickly in that the comment period closes July 30th. If we do not feel there will be a legitimate amount of time to prepare our comments we will ask for the comment period to be extended or that the Corp hold a public hearing on each of the projects

Thank you.

For CRWC

David L. Deen
River Steward



Upper Valley Lake Sunapee
Regional Planning Commission

July 2, 1999

Mr. Richard Heidebrecht
US Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751

Dear Mr. Heidebrecht:

The purpose of this letter is to follow-up with written comments on the draft Master Plan prepared for the North Hartland Lake Project located in Hartland and Hartford, Vermont. These written comments reiterate the verbal comments made at the public meeting conducted on July 23, 1999 at 7:00 p.m. at Damon Hall in Hartland, Vermont.

The major local issue that surfaced at the public meeting in June, 1998 was the safety and adequacy of the road system connecting the Quechee Gorge and the North Hartland Lake project site. Again, it was the focal point of discussion at the June 23, 1999 public meeting on the draft Master Plan. In the development of the Quechee Gorge Master Plan, the Town of Hartland expressed a concern for increasing traffic in their Town. The plan indicated that problems are emerging as a result of increasing through-traffic (travelers from the south accessing Route 4 and Quechee through Hartland, along the Hartland-Quechee Road) and increasing traffic along Clay Hill Road as an access to the North Hartland Lake recreational facility. Hartland's goal is to ensure that their town is not further impacted by possible changes in Quechee or the promotion of the North Hartland Lake recreation area. The Quechee Gorge Master Plan recognized the safety concern with the Hartland-Quechee Road/ Clay Hill Road intersection and recommended improving that intersection as part of Phase 3 improvements under that Plan. In a letter to you dated June 24, 1998, the Regional Planning Commission recommended that the need for the improvement to the Clay Hill/Quechee Hartland Road intersection and the adequacy of Clay Hill Road to handle increased traffic should be assessed through a traffic study based on the facilities and services to be provided at the North Hartland Lake site and any marketing program to promote the site as outlined in the Master Plan. This recommendation was not incorporated into the work completed for the draft Master Plan. Once again, the Regional Planning Commission

urges the Corps of Engineers to have a traffic study prepared by a professional traffic consultant to evaluate the traffic issues addressed above. To adequately assess the traffic generated between the Quechee Gorge site and the North Hartland Lake site using the Clay Hill and the Quechee-Hartland Roads, this traffic study should include an origination and destination component. It was indicated at the conclusion of the meeting that a traffic study would be done prior to implementing the recommendations in the Master Plan. The Regional Planning Commission recommends that this traffic study be completed and reviewed at another well noticed, local public meeting prior to implementation of any of the recommendations in the Master Plan. This seems particularly important since this has been the major issue raised both last year and this year at the public meetings on this project and nothing has been done to date to address these local concerns. It seems only fair that the anticipated traffic impacts of the recommendations contained in the draft Master Plan be studied and discussed as part of the public review process before asking the public whether or not they support the recommendations contained within the Plan.

Another issue raised at the public meeting conducted on June 18, 1998 was the adequacy of signage directing visitors to and from the North Hartland Lake site. One of the actions for improving recreational facilities and activities within the project area as outlined on page 7-1 of the draft Master plan is to "Install signage along Route 4, at Clay Hill Road, and at the entrance to the Flood Control Facility". It was clarified at the meeting that the signage along Route 4 is intended to direct visitors from Route 4 to Route 5 and then up Clay Hill Road (new sign) to the facility entrance (new sign). The intent of this recommendation is to direct visitors from the Quechee Gorge site to the North Hartland Lake site without using the Quechee-Hartland Road and the Clay Hill Road north of the North Hartland Lake site. It was revealed at the meeting that visitors leaving the North Hartland Lake site encounter a sign indicating the direction (north along Clay Hill Road and the Quechee-Hartland Road) and distance to the Quechee Gorge site. It is recommended that visitors be directed to the Quechee Gorge site from the North Hartland Lake site in the reverse of that route discussed above; namely Clay Hill Road to Route 5 to Route 4 and not be directed to use Clay Hill Road and the Quechee-Hartland Road.

At the June 18, 1998 public meeting, there was considerable interest expressed in the opportunity for the North Hartland Lake site to be used as a hiking destination particularly if the North Hartland Lake site is connected with the Quechee Gorge site. The draft Master Plan makes no mention of this concept. It was explained at the meeting that this is because to connect a trail between the two sites would require routing the trail through private property which would require easements from private property owners in which the Corps of Engineers does not want to get involved. However, such an effort could be spearheaded by a local citizens group who would be willing to make those contacts. My understanding is that without this concept for a connecting trail being incorporated into the Master Plan, any future proposal to build such a trail would first require that the Master Plan be amended to incorporate such a concept. Further, it was indicated that such a trail connection would be beyond the time horizon planned for updating this Master Plan which is supposed to be five years. However, given the fact that the existing Master Plan has not been updated for twenty years, the actual time horizon for updating these Master Plans seems to be much longer than the planned time horizon. For these reasons, the Regional Planning Commission recommends the concept for a trail connecting the Quechee Gorge and the North Hartland Lake site be incorporated into the Master Plan at this time.

I hope these comments are helpful and constructive. Please do not hesitate to contact me if you have any questions pertaining to this matter or if I can assist further with this project.

Sincerely,



Kenneth B. McWilliams
Principal Planner

cc. Cheryl Rivers, Windsor County Senator
Richard McCormack, Windsor County Senator
Ben Ptashnik, Windsor County Senator
Matt Dunne, Windsor County Representative, District #3
Michael Kainen, Windsor County Representative, District #2
Ralph Lehman, Windsor County Representative, District #2
Carolyn Kehler, Windsor County Representative, District #2
Chairs of the Board of Selectmen, Planning Board, Conservation Commission, Recreation
Commission in Hartland and Hartford
Hunter Rieseberg, Hartford Town Manager
Robert Stacey, Hartland Town Manager
Patricia Peat, UVLSRPC Commissioner from Hartland
Richard Waddell, UVLSRPC Commissioner from Hartland
Lori Hirshfield, Director of Hartford Planning & Development Services & UVLSRPC
Commissioner from Hartford
James Saudade, UVLSRPC Commissioner from Hartford
Mike Lavalla, UVLSRPC Commissioner from Hartford
John Nunez, Director of the Hartford Recreation Department
Rob Pickett, Chair of the Hartland Recreation Committee
Mark Rosenthal, U.S. Army Corps of Engineers
Jeffery D. O'Connell, ENSR



CONNECTICUT RIVER WATERSHED COUNCIL
Protecting the Connecticut River Since 1952

Received
7/12/99

UPPER VALLEY OFFICE: P.O. Box 206, Saxtons River, VT 05154
PHONE: 802/869-CRWC FAX: 802/869-2137 NH 603/675-2518 EMAIL: crwc@sover.net

Colonel Michael W. Pratt
US Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Re: North Hartland Lake Flood Control Project

Dear Colonel Pratt:

The Connecticut River watershed Council (CRWC) would like to submit the following comments about the updated draft Environmental Assessment (EA) on the North Hartland Lake Flood Control Project.

At the public hearing held in Hartland on this project homeowners on the access road to the lake expressed concern about the effects of the Corps improving the public use facilities at the lake. The public's main concern was the increased use of the lake that improved facilities would stimulate in the general public. The road traffic already impacts on their quality of life and increased traffic would cause further problems for them. At its present level of road traffic, parents will not allow their younger children to ride bikes on the road. Increased traffic will increase the risks to the walking, cycling and driving public. Local officials, the Selectboard and the Regional Planning Commission have all commented that before the improvements described in the plan are implemented that a traffic impact study be completed by the Corp. CRWC agrees with these concerns and recommends that the Corps complete a traffic study and an implementation plan for traffic control that will hold steady or lessen the amount of vehicle traffic on the access road to the lake.

Over the period of June 1999, a dry month by any standard, the flow at North Hartland fell below the default US F&WS standard 16 of 30 days. On all days of the month the flows exceeded the Vermont permitted minimum flow requirement as presented at the public hearing. There would seem to be no reason the Corps could not begin to set the environmentally responsible standard for the watershed and request a higher minimum flow level for the North Hartland Lake Project than the 23-cfs now permitted for the facility.

CRWC knows that there are other impoundments on the Ottoquechee River that may have permitted flows lower than the US F&W standard but that situation should not limit the Corps in terms of their permitted minimum flow requirements at their facilities. CRWC recommends that the Corps begin the process to amend their Vermont water

quality certificate to bring the permitted flow levels below the dam into compliance with Vermont and/or the US Fish and Wildlife guidance for flows.

The Corps staff at the North Hartland facility has undertaken testing of the water quality in the lake. The test results provide information important to protecting the future water quality in the lake. Although it could be assumed that testing would be continued in the future from the discussion about testing in the water quality sections of the draft EA, there is no clear statement that this testing will continue. If the testing should stop for some reason and then the water quality significantly changed as it has over the last 5 years, the Corps would not be in a position to address any degradation in water quality quickly with good information. CRWC recommends that the final EA specifically state that water quality testing for temperature, DO, pH, turbidity, conductivity, heavy metals, nutrient loading and e coli continue on a regular basis. CRWC also would recommend, based on recent changes in water quality especially nutrient loading, that the lake be classified as a Class III lake for a period of 5 years so that the frequency of water quality testing is increased in the lake.

For CRWC

A handwritten signature in black ink, appearing to read "David L. Deen", written over a horizontal line.

David L. Deen
River Steward

CC Mark Rosenthal Corps
Peter Richardson VTCRJC/CRWC
Guy Crosby CRWC/TU
Nat Tripp VTCRJC

Harlow Brook Farm
314 Clay Hill Road
Hartland, Vermont 05048

July 14, 1999

Mr. Richard Heidebrecht
U.S. Army Corps of Engineers, New England District
696 Virginia Road
Concord, MA 01742-2751

Dear Mr. Heidebrecht:


I am writing to express my deep concern about the Army Corps' plans to expand the recreational facility at the North Hartland Dam. As a 30-year resident of this community, I have watched the rise in the amount of traffic on Clay Hill Road with distress, but also with a recognition that increases in population in town bring with them an inevitable increase in cars and trucks passing by. The traffic noise and dirt are particular onerous between early July and Labor Day, when tourism is at its peak in this area.

The thought of **deliberately** increasing that traffic appalls me. I have a young grandson who will visit me in the summers. I would be afraid to let him ride his bike on the road if there were more traffic, especially if these are drivers unfamiliar with country roads that turn from dirt to pavement back to dirt again, as Clay Hill Road does. We have no sidewalks, and most of us have houses close to the road. The road itself is difficult to maintain, and additional traffic will make its maintenance more costly to us as taxpayers, and decrease the quality of the roads we travel every day. We have deliberately chosen to live away from the villages, sacrificing convenience for relative peace and quiet. Expansion will place an unbidden burden on us.

I am also unhappy about the prospect of a bike and hiking path behind my house. I am a widow living alone, a quarter of a mile from my nearest neighbor, and the idea of large numbers of strangers driving past my house and walking and biking behind it makes me feel very vulnerable. We have no police in Hartland, which has always been fine with me, but I will worry if the environment changes dramatically.

As a resident of Hartland, and a citizen of Vermont, I strongly request that you reconsider your master plan.

Sincerely,



Faith Dunne

Cc: Senator Patrick Leahy
Senator James Jeffords
Rep. Bernie Sanders



CONNECTICUT RIVER WATERSHED COUNCIL

Protecting the Connecticut River Since 1952

UPPER VALLEY OFFICE: P.O. Box 206, Saxtons River, VT 05154

PHONE: 802/869-CRWC FAX: 802/869-2137 NH 603/675-2518 EMAIL: crwc@sover.net

July 20, 1999

Colonel Brian E. Ostendorf
US Army Corps of Engineers
696 Virginia Road
Concord, NH 01742-2751

Re: Environmental Assessment Master Plans on Flood Control Projects

Dear Colonel Pratt:

This is a follow up letter to CRWC's previous letter concerning the following Corps facilities: Union Village Dam, Thetford, VT; North Springfield Lake, Weathersfield, VT; North Hartland Lake, Hartland, VT; Surry Mountain Lake, Surry, NH; and the Edward MacDowell Lake, Peterborough, NH.

I would like to thank your office for alerting me to the web site where the flow records for the facilities are posted. That information will be helpful in evaluating the master plans when they are written.

As you develop the Environmental Assessments and the Master Plans CRWC asks that you consider the following concerns.

That all Corp facilities at time of low flows meet or exceed the US Fish & Wildlife Service's guidance for minimum downstream flow. Regardless of the recreation interests, the downstream aquatic biota should be protected by the Corp dam releases.

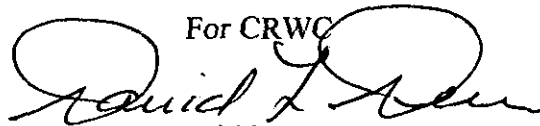
That the Corp evaluate the benefits of flood flows to the river to maintain channel configuration and sediment movement down the river channel. Flood events are a necessary part of healthy habitat for aquatic biota and there should be a portion of the plans that address flood flow releases.

That the Corp include in their plans a mitigation plan for fish passage above and below the dams for native species.

That the Corp coordinate their flow levels at high and low flow periods with other dam owners/operators within the watershed both for the protection of human life and property but also for the protection of the health of the river for aquatic biota.

These plans and their associated environmental assessments occur only every 25 years or so based on the dates given in your notice on these five facilities. CRWC would like to ask the Corp to consider developing a full EIS on these facilities. There are more issues than can be set out in a brief letter and a full EIS would allow for CRWC and other interested parties to be involved in addressing the issues.

Please keep us informed on the development of the plans and your response to our request for an EIS on these facilities. Thank you.

For CRWC

David L. Deen
River Steward



United States Department of the Interior

FISH AND WILDLIFE SERVICE

New England Field Office
22 Bridge Street, Unit #1
Concord, New Hampshire 03301-4986



July 21, 1999

U.S. Army Corps of Engineers
ATTN: Mr. Richard Heidebrecht (Planning Branch)
696 Virginia Road
Concord, Massachusetts 01742-2751

Dear Mr. Heidebrecht:

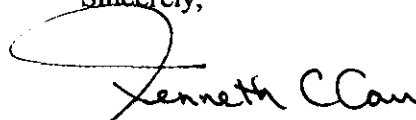
This is in response to your June 15, 1999 letter requesting our comments on the draft North Hartland Lake Master Plan. We appreciate the opportunity to comment on this document.

According to the Executive Summary of the document, "the Master Plan prescribes an overall land and water management plan, resource objectives, and associated design and management concepts ...". It also states that "the natural and man-made resources at the project will continue to be managed to provide the best combination of responses to regional and ecosystem needs, project resources and capabilities."

The Master Plan focuses primarily on an inventory and analysis of the natural, cultural, and recreational resources within the project boundaries. It does not address, however, the impact of the project upon resources outside of the project boundaries. One issue that is not addressed, for example, is the effect of water management and flow regulation upon the downstream fishery resources. While this may not be within the purview of the Master Plan, we believe that consideration of these effects should be included in the natural resources goals and objectives discussed in Section 5.1 of the document. Therefore, we recommend that natural resources objective 2 (Page 5-1, line 20) be amended to read: Enhance and protect fish and wildlife habitat for indigenous species in all areas affected by the project through the use of water management, flow regulation, and various woodland, wetland, and open land management programs.

Once again, we appreciate the opportunity to comment on this document. If you have any questions concerning these comments, please contact Philip Morrison at (603) 225-1411.

Sincerely,

A handwritten signature in black ink, appearing to read "Kenneth C. Carr". The signature is fluid and cursive, with a large loop at the beginning.

Kenneth C. Carr
Acting Supervisor
New England Field Office



State of Vermont

Department of Fish and Wildlife
Department of Forests, Parks and Recreation
Department of Environmental Conservation



AGENCY OF NATURAL RESOURCES

DEPARTMENT OF FISH AND WILDLIFE
103 South Main Street, 10 South
Waterbury, Vermont 05671-0501

Tel.: (802) 241-3700
TDD: 1-800-253-0191

Nongame & Natural Heritage Program
July 16, 1999

U.S. Army Corps of Engineers, NE District
Mr. Richard Heidebrecht (planning Branch)
696 Virginia Rd.
Concord MA 01742-2751

Re: draft North Hartland Lake Master Plan

Dear Mr. Hitch:

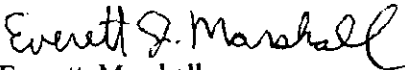
Thank you for the opportunity to review the master plan. We welcome and support the natural resource goals and objectives listed in Section 5.1. Our Department of Fish and Wildlife is available for consultation on your efforts of meeting these goals and objects and we would appreciate you keeping us abreast of your progress.

We were pleased that the Master Plan references and summarizes the following report that our program completed in the summer of 1996: *Rare Plants and Animals and Significant Natural Communities at North Hartland Lake*.

For your information, in 1992 our program located the dwarf-wedge mussel at the mouth of the Ottauquechee River. The dwarf-wedge mussel is federally endangered species. We believe that scheduled or unscheduled de-watering events, and also major dam failures, have the potential to impact this and other nongame species downstream. We would like our Vermont Department of Fish and Wildlife to be consulted of such events before they occur, unless they are unplanned and happen without the opportunity to contact us. In which case we would like to be informed of their occurrence.

We may provide additional comments for the EA on the operation and maintenance of this flood control project and we look forward to future coordination. Thank you.

Sincerely,


Everett Marshall
Biologist/Data Manager
Tel: 802-241-3715
Email: everettn@fwd.anr.state.vt.us

cc: Scott Darling
Steve Parren
Forrest Hammond
Rod Wentworth
Mark Ferguson

July 29, 1999

Engineering/Planning Division
Planning Branch

Honorable Bernard Sanders
Representative in Congress
One Church Street
Burlington, Vermont 05401-4451

Dear Mr. Sanders:

During the temporary absence of our District Engineer, Colonel Brian E. Osterndorf, I am responding to your letter of July 14, 1999, which enclosed a letter from your constituent, Patricia Peat, a member of the Hartland, Vermont Selectboard. Ms. Peat's letter raised several concerns regarding our ongoing study to update the Master Plan at our North Hartland Lake flood control project in Hartland and Hartford, Vermont. These concerns include coordination of this Master Plan update with town officials, and the potential for increased traffic on Clay Hill Road.

The update of our Master Plan for North Hartland Lake was initiated on May 13, 1998 by forwarding letters to Federal, State, and local officials, and issuing a public notice and press release. These documents requested comments or other input to assist this office in preparing the Master Plan. During the next step in the process, this office conducted two public workshop meetings in Hartland on June 18, 1998. One workshop was held from 2:00 to 4:00 p.m., and the second was held from 7:00 to 9:00 p.m. to allow maximum attendance by both interested officials and individuals interested in the study. Local officials were informed of this meeting by letter dated June 5, 1998. A follow-up meeting was also held with Hartland officials during the evening of July 1, 1998. This meeting was attended by the Town Manager, and representatives from the Selectboard, Recreation Center, and Conservation Commission.

The draft Master Plan update was then prepared and distributed for public review in June 1999. Numerous copies of the draft report were forwarded to Federal, State, Hartland and Hartford officials for review, and a public meeting was held in Hartland on June 23, 1999. A press release announcing the date of the public meeting and the availability of the report was issued on June 14, 1999.

Most of the specific concerns expressed by Ms. Peat were discussed in detail at the June 23, 1999 public meeting. Based on the improvements proposed at the recreation area, a large percentage of the meeting attendees were concerned with increases in traffic on Clay Hill Road. During the meeting, it was explained that the addition of signs on Route 4 would not be to direct visitors directly to Clay Hill Road. They would direct people from the Quechee Gorge area easterly to Route 5 and then southerly to the opposite end of Clay Hill Road. Use of Clay Hill

Road would then be limited to approximately one mile of roadway between the access road to the project and Route 5. As discussed at the public meeting, signs at the Route 5 intersection and at the project access road would help minimize use of Clay Hill Road to this one-mile section. This office agrees with Ms. Peat that directing visitors down the length of Clay Hill Road, a Class 2 road that is 40 percent unpaved, would be ill-advised, not to mention unsafe. With regard to the potential for increased traffic on Clay Hill Road, this office also agreed to conduct a traffic study and present the results before recreational improvements are made.

Another concern expressed by Ms. Peat was the size of the recreation area. The developed or open space area at the site is currently about eight acres. This does not include an adjacent nature trail area. When the eight acres of forested land associated with the trail are included with the open areas, the total size of the recreation site is currently 16 acres. Although this may have given the appearance that the size of the recreation area was being doubled, it only included the nature trail in the area allocated for recreational use. There are no plans to increase the size of the recreation area. The goal of recommended improvements was to alleviate overcrowding of specific areas such as the beach and at the picnic shelters.

Also, for your information on December 15, 1998, the New England District hosted a partnering session with members of the Vermont Agency of Natural Resources. This successful venture has resulted in improved communications between the Corps of Engineers and our counterparts in the State of Vermont. Through this and other outreach efforts, I hope to bring to the public a new standard of excellence in management of Vermont's natural resources.

If you have any questions concerning this matter, please contact me at (978) 318-8222, or Mr. Richard Heidebrecht, the Study Manager, at (978) 318-8513.

Sincerely,

John L. Rovero
Lieutenant Colonel, Corps of Engineers
Acting District Engineer

Copy furnished

Honorable Bernard Sanders
House of Representatives
Washington, DC 20515-4501

Cf:

CENAD-ET-P (Mr. Tosi)

CENAD-EX

Heidebrecht, Bldg. 2 (NHL-CongSanders)

Juhola, Bldg. 1

Williams, Bldg. 1

Curran, UCRB

Rosenthal, NHL

PAO

EA

Reading Files

Eng/Plng Files

BERNARD SANDERS
MEMBER OF CONGRESS
VERMONT, AT LARGE

2202 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515-4501
TELEPHONE: (202) 225-4115
FAX: (202) 225-6790
E-Mail: Bernie@mail.house.gov

1 CHURCH STREET, SECOND FLOOR
BURLINGTON, VT 05401-4417
TELEPHONE: (802) 862-0697
TOLL FREE: (800) 339-9834
FAX: (802) 860-6370

Congress of the United States
House of Representatives
Washington, DC 20515-4501

PLEASE REPLY TO VERMONT DISTRICT OFFICE

July 14, 1999

COMMITTEE ON BANKING AND
FINANCIAL SERVICES

SUBCOMMITTEES:

RANKING MINORITY MEMBER:
GENERAL OVERSIGHT AND
INVESTIGATIONS

DOMESTIC AND INTERNATIONAL
MONETARY POLICY

COMMITTEE ON GOVERNMENT
REFORM AND OVERSIGHT

SUBCOMMITTEES:

NATIONAL ECONOMIC GROWTH,
NATURAL RESOURCES, AND
REGULATORY AFFAIRS

HUMAN RESOURCES

CO-CHAIR: PROGRESSIVE CAUCUS

Mr. Darryl J. Deleppo
Executive Officer New England District
Army Corps of Engineers
696 Virginia Road
Concord, Massachusetts 01742

Dear Mr. Deleppo:

Please find enclosed a copy of a letter from my constituent, Patricia Peat, a member of the Hartland, Vermont Selectboard. As you can see, the Town of Hartland has requested my assistance concerning the master plan for the North Hartland Dam complex.

Ms. Peat mentions several issues which concern the town, including increased traffic on Clay Hill Road, additional burden to town services without compensation, and the use of signage on Route 4 to direct passersby to the dam. However, the town explains that their most important request is that the Army Corps of fully involve town officials and residents in discussions of the plan, recognize and respond to their concerns, and maintain open and respectful communication regarding this matter. It greatly concerns me that Hartland officials believe a federal agency is ignoring their comments, questions and concerns about a proposed federal project which will significantly impact their town.

I respectfully request that you look into this matter at your earliest convenience, and that you give full and fair consideration, consistent with applicable law and regulations, to Town of Hartland's concerns. I also request that you keep my Vermont District Office apprised of your disposition in this matter.

Thank you in advance for your consideration of this matter.

Sincerely,



Bernard Sanders
Member of Congress

cc: Ms. Patricia Peat

copy

JUN 28 1999

Town of Hartland

P.O. Box 349
Hartland, Vermont 05048

Town Manager
802-436-2119

Town Clerk
802-436-2444

June 23, 1999

Mr. Richard Heidebrecht
U.S. Army Corps of Engineers, New England District
696 Virginia Road
Concord, Massachusetts 01742-2751

Dear Mr. Heidebrecht:

I have reviewed the draft master plan for the North Hartland Dam complex on behalf of the Hartland Selectboard. Let me pass on some specific concerns.

The master plan proposes to more than double the size of the beach at the Dam. It seems also to double the amount of recreational area from eight to sixteen acres (compare pages 3-23, line 636, and page 6-5, lines 88-89, with page 8-1, line 15). It proposes to add signs for the Dam on U.S. Route 4 and on Clay Hill Road.

We do not see recognition of the concerns expressed by the Hartland Selectboard or Planning and Conservation Commissions at the meeting of July 1, 1998, and in my letter of July 7 from the Selectboard. I am not aware that anyone connected with the Corps of Engineers or its consultants has ever spoken to the town manager or the legislative body to ask us about the effect of expansion plans on our town roads and on that neighborhood or to solicit opinion from neighbors.

The facility in Hartland is in a completely residential area. The houses are typically located close to the road. Practically all the trips anyone makes to the Dam are destination driven; that is, the trips represent new or additional traffic, not traffic that is passing by and is diverted to enter the facility. While the road at the dam entrance is paved, 40 percent of the four-mile length of Clay Hill Road is unpaved. There are no sidewalks. The town has no plans to pave the remainder of the road. The town has no police force and no plans for one.

We do not see in the master plan any estimate of the additional visits that will come with expansion. There is no information on current traffic counts or winter versus summer traffic numbers on Clay Hill Road. Consequently, there is no estimate of the additional traffic that we will experience.

If expansion at the Dam adds traffic on local roads—particularly on the Class 2 Clay Hill Road, which represents 29 percent of our Class 2 road mileage—and the Town is neither a party to this decision nor compensated in any way for the impact, we are being asked to shoulder a burden not of our making, not of our planning, and in fact contrary to our Town Plan and our own inclinations.

To suggest adding directional signs on U.S. Route 4 to the Dam area seems ill-advised. Town officials have repeatedly said we do not want to link the Dam area with the Quechee Gorge project by road. The Regional Planning Commission recognizes that decision and has reported it to you. The Quechee Gorge project is a commercial project on a U.S. highway; the Dam facility in Hartland is in a residential neighborhood on a partially paved road. Officials or private business

organizations in another town on a U.S. highway have different interests from ours. Signs are not a benefit to us.

Some specific comments. Page 2-10, lines 219-220, describes the Dam as located 1.5 miles east of "Hartland Town Center." It may be 1.5 miles west of U.S. Route 5 and therefore two or so miles from North Hartland village, but it is five or six miles north of Hartland Three Corners.

Page 3-40, lines 943-951, describes what the preparers of this plan call "the only major use conflict observed," which refers to U.S. Route 4 in Hartford (not Hartland), four to five miles from the entrance to the Dam facility. There is no indication here that additional traffic for Hartland in a strictly residential area is a major conflict with our Town Plan.

In Vermont, individuals, organizations, or municipalities planning an expansion such as you describe must participate in an Act 250 process that assures adequate notice and granting of party status to abutters, local and regional planning commissions, and legislative bodies. This process considers local input on issues such as compliance with regional and town plans, aesthetics, lighting, burdens on town services, and traffic. A federal government facility evidently is exempt from such a process, but we are confident this does not mean that the Corps of Engineers intends to ignore a municipality's concerns about plans that have negative effects on a neighborhood.

There may very well be interest in increased swimming area at the Dam. We also understand that the people who work there are proud of the resource and motivated to make it a nice place, and we are grateful for their interest and commitment.

This facility in Hartland was built to protect downstream Connecticut from upstream floods. We trust that the Corps of Engineers in Concord, Massachusetts, will extend to us the courtesy of full participation in decisions that affect our community. Thank you for your consideration.

Sincerely yours,

Patricia B. Peat
Selectperson and Corresponding Secretary

cc: Governor Howard Dean
U.S. Senator James Jeffords
U.S. Senator Patrick Leahy
U.S. Congressman Bernard Sanders✓
State Representative Matt Dunne
State Senator Richard McCormack
State Senator Ben Ptashnik
State Senator Cheryl Rivers

Town of Hartland

P.O. Box 349
Hartland, Vermont 05048

Town Manager
802-436-2119

Town Clerk
802-436-2444

July 7, 1998

Mr. Richard Heidebrecht
U.S. Army Corps of Engineers, New England District
696 Virginia Road
Concord, Massachusetts 01742-2751

Dear Mr. Heidebrecht:

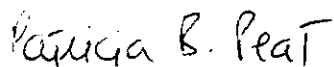
Thank you for taking the time to talk to town officers in Hartland on July 1, 1998, about the master plan for the North Hartland Flood Control Dam. I am writing to reiterate that the Hartland Selectboard is not interested in development projects at the Dam that will increase traffic on Clay Hill Road.

This facility is located in a residential area on a Class 2 town road, whose public right of way, which is under the control of the Selectboard, is three rods wide (forty-nine and a half feet). The road is paved at each end and gravel in the middle; like all Vermont's town roads, it has no sidewalks. The road in its current condition is perfectly sufficient for the town's uses and the residents' uses. There are on this road—together with vehicle traffic—pedestrians, bicyclists, farm vehicles, and horseback riders. We would not be in favor of marketing changes at the Dam that would have the effect of putting additional vehicle traffic on this road.

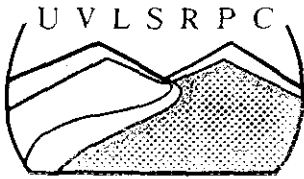
If this facility were operated by a private owner or by a municipality, the changes that the Corps of Engineers may be proposing, depending on the amount of land affected, could require an Act 250 application, with notice to all abutters, who could be admitted to party status. And under Act 250, one of the ten applicable criteria on which a project can be conditioned is its effect on highway transportation. In other words, expansion in the operations of a facility normally deserve full public comment.

We would appreciate your keeping us informed of your progress on the plan as well as giving us advance notice of meetings so that in the future we can arrange to be represented. Thank you for this opportunity to register our concerns.

Sincerely yours,



Patricia B. Peat
Selectperson and Corresponding Secretary



Upper Valley Lake Sunapee
Regional Planning Commission

June 24, 1998

Richard Heidebrecht
US Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751

Dear Mr. Heidebrecht:

The purpose of this letter is to follow-up with written comments on the development of a Master Plan for the North Hartland Lake Flood Control Project located in Hartland and Hartford, Vermont. These written comments for the most part reiterate the verbal comments made at the meeting conducted on Thursday afternoon, June 18, 1998 at the Hartland Recreation Center on this project.

First of all, the Regional Planning Commission was pleased to see you were able to utilize the Geographic Information System (GIS) coverages we developed as part of the Quechee Gorge Public Lands Highway Study. The presentation of the GIS layers using the ARC VIEW program with the overhead projector was very effective.

The Regional Planning Commission has several points to make relative to the proposed project. The issue that rises to the surface at this point is one of process and opportunity for local input into the project. At the afternoon workshop meeting, you indicated one of the main purposes of the workshop meetings was to gather input from local boards and commissions and interested public in the area. My understanding is that notice was given to the Towns of Hartford and Hartland by sending a notice of the workshop meetings to the two Town Clerks with hope that they would pass along this information to all the other Town boards and officials who might have an interest in commenting on the project. From the sparse attendance at the meetings by representatives of local boards and commissions, abutters and the general public, it seems apparent that the notice to the local officials, abutting property owners and interested citizens was inadequate. Since this is the only opportunity for public input in the study process prior to preparation of a draft report, the Regional Planning Commission strongly urges you to conduct another workshop prior to preparation of the draft report with broader notice given to the Town boards and commissions in Hartland and Hartford, the abutting property owners and the general public. Towards that end, please find attached a list of Town representatives to the various boards and commissions according to our records at the Regional Planning Commission. Additionally, a copy of the abutters mailing list used during the planning process of developing the Quechee Gorge Master Plan could be obtained from Wilbur Smith & Associates (802-223-3305). This abutters mailing list could be updated using the Lister's records in Hartland and Hartford.

In the development of the Quechee Gorge Master Plan, the Town of Hartland expressed a concern for increasing traffic in their Town. The plan indicated that problems are emerging as a result of increasing through-traffic (travelers from the south accessing Route 4 and Quechee through Hartland, along the Hartland-Quechee Road) and increasing traffic along Clay Hill Road as an access to the North Hartland Lake recreational facility. Hartland's goal is to ensure that their town is not further impacted by possible changes in Quechee or the promotion of the North Hartland Lake recreation area. The Quechee Gorge Master Plan recognized the safety concern with the Hartland-Quechee Road/ Clay Hill Road intersection and recommended improving that intersection as part of Phase 3 improvements under that Plan. The need for that intersection improvement and the adequacy of Clay Hill Road to handle increased traffic should be assessed through a traffic study based on the facilities and services to be provided at the site and any marketing program to promote the site as outlined in the Master Plan.

Conclusions of the Sign Analysis in the Quechee Gorge Master Plan included the following:

1. Existing signs are inadequate for informing drivers of the location of the North Hartland Dam.
2. Visitors to either the Dam or Gorge are not provided with adequate signage for traveling between the two recreation areas. According to the visitors surveys done for the Quechee Gorge Master Plan, about 90% of the visitors to the Gorge are not aware of the North Hartland Lake.
3. Improved signs would improve safety by assisting drivers to plan turning movements off the road.

The Regional Planning Commission recommends that a Sign Analysis and Plan be done as part of this Master Plan to address these issues. This should be tied in with any marketing plan developed to promote the site.

The assessment of the North Hartland Lake facility in the Quechee Gorge Study concluded that trail usage appears to be quite low (less than 3% of the annual visitors), yet the trail condition and quality is very high. The area offers opportunity as a hiking destination, especially if connected with the Gorge area. Other possible connections between the Gorge and the Dam for biking and cross country skiing should be considered in this Master Plan.

The Quechee Gorge Management Committee was formed to assist with the implementation of the Quechee Gorge Master Plan. Is this Master Planning effort being coordinated with that Committee?

Will a users survey be done as part of this Master Plan effort to identify who uses what facilities when, and to ascertain their input on the types of facilities and activities they would like to see developed? This would seem to be important information in developing a marketing and improvement plan for the site. Will on-site rangers will be able to follow through with a users survey at the gate this summer as discussed at the meeting?

The time when the gate to the site is open to the public was not made clear to me. I thought I heard at the meeting that the gate to the site is open 365 days each year. Is that true? The

assessment of the North Hartland Lake site in the Quechee Gorge Study indicates the facility is officially closed for 33 weeks of each year. I know from past personal experience that the gate has not been open at certain times of the year. Has the Corps of Engineers changed their policy on when the gate is open? My point is that as a user of the facility in non-summertime, I am not sure when access is assured. Uncertainty about access to the facility in the spring, fall and winter may contribute to lower usage during those times. A clearer policy on access may alleviate this to some extent.

I hope these comments are helpful and constructive. Please do not hesitate to contact me if you have any questions pertaining to this matter or if I can assist further with this project.

Sincerely,



Ken McWilliams
Senior Planner

cc. Cheryl Rivers, Windsor County Senator
Richard McCormack, Windsor County Senator
Ben Ptashnik, Windsor County Senator
Matt Dunne, Windsor County Representative, District #3
Lynn Bohi, Windsor County Representative, District #2
Ralph Lehman, Windsor County Representative, District #2
Carolyn Kehler, Windsor County Representative, District #2
Chairs of the Board of Selectmen, Planning Board, Conservation Commission, Recreation
Commission in Hartland and Hartford
Hunter Rieseberg, Hartford Town Manager
Robert Stacey, Hartland Town Manager
Patricia Peat, UVLSRPC Commissioner from Hartland
Richard Waddell, UVLSRPC Commissioner from Hartland
Lori Hirshfield, Director of Hartford Planning & Development Services & UVLSRPC
Commissioner from Hartford
James Saudade, UVLSRPC Commissioner from Hartford
Mike Lavalla, UVLSRPC Commissioner from Hartford
John Nunez, Director of the Hartford Recreation Department
Rob Pickett, Chair of the Hartland Recreation Committee
Mark Rosenthal, U.S. Army Corps of Engineers
Jeffery D. O'Connell, ENSR

William Adams, Chair
Hartford Brd of Selectmen
15 Bridge Street
White River Jct, VT 05001

David Dean, FGF
Hartford Recreation Dept.
15 Bridge Street
White River Jct, VT 05001

Lori Hirshfield, Dir.
Hartford Plng/Dev Service
15 Bridge Street
White River Jct, VT 05001

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Hartford Recreation Comm.
47 Chandler Farm Road
White River Jct, VT 05001

Jean Lariviere
Hartford Conserv. Comm.
325 Connecticut River Rd.
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Hartford Town Manager
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Hartford Recreation Dept.
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Raymond CerasoliChair
Hartford Recreation Comm.
5 Sargent Street
White River Jct, VT 05001

Arthur Trottier, Sec.
Hartford Recreation Comm.
5 Smith Road
White River Jct, VT 05001

Randy Wagoner, V. Chair
Hartford Brd of Selectmen
15 Bridge Street
White River Jct, VT 05001

Richard Grassi
Hartford Brd of Selectmen
15 Bridge Street
White River Jct, VT 05001

Aaron MacAskill, Secty.
Hartford Recreation Committee
P.O. Box 1432
White River Jct, VT 05001

Dana Young
Hartford Conservation Commiss.
P.O. Box 4325
White River Jct, VT 05001

Patty Frechette
Hartford Parks and Recreation
4 Apple Lane
White River Junction, VT 05001

Martin Banank, Chair
Hartford Conserv. Comm.
P.O. Box 721
Quechee, VT 05059

Fariduddin Oertly
Hartford Conserv. Comm.
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Quechee, VT 05059

Gayle Ottman
Hartford Board of Selectmen
P.O. Box 748
Quechee, VT 05059

James Peters, Treas.
Hartford Conserv. Comm.
P.O. Box 18
West Hartford, VT 05084

Richard Ballou
Hartford Board of Selectmen
69 High Pastures Road
Woodstock, VT 05091

Andrea Ambrose
Hartland Conserv. Comm.
RR #1, Box 4 A
Hartland, VT 05048

Robert Stacey
Hartland Town Manager
P.O. Box 349
Hartland, VT 05048

Thomas Campbell
Hartland Brd of Selectmen
P.O. Box 330
Hartland, VT 05048

Geoffrey Dates, Co-chair
Hartland Conserv. Comm.
RR #1, Box 209
Hartland, VT 05048

Pierre Fournier, Co-chair
Hartland Conserv. Comm.
P.O. Box 349
Hartland, VT 05048

Charles Marrin
Hartland Conserv. Comm.
RR #1, Box 151 A
Hartland, VT 05048

Patricia Peat
Hartland Brd of Selectmen
RR #1, Box 162
Hartland, VT 05048

Thomas White, Chair
Hartland Brd of Selectmen
P.O. Box 349
Hartland, VT 05048

Jennifer Waite, Clerk
Hartland Conserv. Comm.
P.O. Box 99
Hartland 4 Cr, VT 05049

Deborah Luquer
Hartland Conservation Comm.
P.O. Box 72
Hartland Four Corner, VT 05049

Norman Davis
Hartland Brd of Selectmen
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N. Hartland, VT 05052

Scott Richardson
Hartland Conserv. Comm.
RR #1, Box 678
Woodstock, VT 05091

Gordon Richardson
Hartland Brd of Selectmen
RR #1, Box 678
Woodstock, VT 05091

*Rob Fickert, Chair
Hartland Recreation Committee
RR #1, Box 4C
Hartland, VT 05048*

HOWARD DEAN, M.D.
Governor



State of Vermont
OFFICE OF THE GOVERNOR
Montpelier 05609

Tel.: (802) 828-3333
Fax: (802) 828-3339
TDD: (802) 828-3345

June 1, 1998

H. Farrell McMillan, P.E.
Chief, Engineering/Planning Division
Department of the Army
New England District, Corps of Engineers
696 Virginia Road
Concord, Massachusetts 01742-2751

Dear Mr. McMillan,

Thank you for the Public Notice and News Release regarding the master planning study of the North Hartland Lake flood control project. I have forwarded the information to Barbara Ripley, Secretary of the Agency of Natural Resources, for her review.

Again, thank you.

Sincerely,

A handwritten signature in black ink, appearing to read "Howard Dean".

Howard Dean, M.D.
Governor

HD/dmr

cc: Secretary Barbara Ripley, Agency of Natural Resources

June 19, 1998

Richard Heidebrecht
US Army Corps of Engineers, NE Division
696 Virginia Road
Concord, MA. 01742-2751

RE: Federal North Hartland Flood Control Project Master Plan Study

Dear Mr. Heidebrecht,

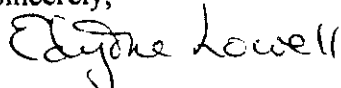
Thanks for an interesting meeting at the Hartland Recreation Center on Thursday, June 18. The group seemed genuinely interested in input from area residents.

I do feel, however, that more members of the public would have been in attendance if the meeting had been warned in the local press. There was one article in the Valley News a few weeks ago announcing that the study was to be made and what agencies of the government were to be involved. I understand that a first meeting date had not been set at that time. I realize you stated that this was primarily a meeting to gain information from the officials involved BUT the public was welcome to be there.

Since your study process suggests a preparation of a draft report as the next step, followed by a public meeting (warned) and then the finalized master plan, I would like to interject a thought. Would it not be more appropriate to have the public fully invited/informed at the initial meeting rather than waiting until after the draft is drawn up? My thought process is that local residents who utilize these facilities have a good deal of general knowledge that would be beneficial to all the various agencies/groups involved in producing the master plan and, if included initially, would make the draft process easier due to their input. I don't like being the only member of the public on board! There must be other viewpoints that would be equally valid and should be heard by the members of the group.

Thank you for your indulgence. I look forward to the next meeting.

Sincerely,



Edythe W. Lowell
93 Tall Timbers
White River Jct., VT. 05001



STATE OF VERMONT
HOUSE OF REPRESENTATIVES
115 STATE STREET
MONTPELIER, VT
05633-5201

June 1, 1998

U.S. Army Corps of Engineers
Planning Branch
ATTN: Richard Heidebrecht
696 Virginia Road
Concord, MA 01742-2751

Dear Mr. Heidebrecht:

I am writing in my capacity as a State Legislator (as the request for comment was addressed), but also as a land owner and lifetime resident of Clay Hill Road that abuts the North Hartland Lake flood plane.

I would open with a request that you send a similar letter to all of those who live on Clay Hill Road who are impacted by decisions made about the North Hartland Lake property. I have contacted many, but feel a formal invitation to comment sent to all of these land owners would be appropriate. Please let me know if for some reason this is not possible.

I have heard a number of concerns raised particularly regarding the upper part of the reservoir. The first is regarding trash both in the river and, since the recent flooding, along the shore line and even into the woods. The degree of trash has alarmed many people who have used that area for recreational hiking, mountain biking, and cross country skiing. In addition it also has raised significant questions about the cleanliness of the lake itself.

There were also concerns regarding the number of dead fish seen floating in the lake. I contacted the manager regarding the apparent kill and was told it was a natural occurrence due to the warmth of the water at that time. I do not doubt this assessment, but combined with the visible pollution, it has caused some alarm.

Over the last few years there has also been a sudden increase in ridge line development. There is presently confusion over which parts of the ridge on the north side of the lake are owned by the Army Corps and which are in private hands. This information

would be helpful in providing comments and planning possible protections of the unspoiled river valley.

I also know of at least one contentious situation over the farming of a field that crosses over into Army Corps land. I would hope that farm land that does cross over into the flood plane would be open to agricultural use with an easily accomplished permission granting process.

Thank you for listening and soliciting comments. I look forward to your response.

Sincerely,

A handwritten signature in black ink that reads "Matt Dunne". The signature is written in a cursive, slightly stylized font. The "M" is large and the "D" is also prominent. The name "Dunne" is written in a more standard cursive script.

Rep/ Matt Dunne
Windsor-3

State of Vermont

Director
(802) 244-7345

Telefax No.
(802) 244-1106



Field Force Division
(802) 244-8775

Criminal Division
(802) 244-8781

Department of Public Safety
DIVISION OF STATE POLICE
State Complex
103 South Main Street
Waterbury, VT 05671-2101

May 26, 1998

H. Farrell McMillan, P.E.
Chief, Engineering/Planning Division
Department of the Army
New England District, Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Dear Mr. McMillan:

I would like to thank you for the opportunity to comment on your investigation.

I suggest that a component for your North Hartland Master Plan Update should include a provision for patrol hours at this facility. I have learned that such patrols have been successful at other US Army Corps of Engineers sites as well as US National Parks.

Please contact me if you would be interested in discussing patrol issues with the Vermont State Police.

Sincerely,

A handwritten signature in cursive script that reads "Glenn W. Cutting".

Lieutenant Glenn Cutting
Station Commander, Bethel
Vermont State Police
RR #1 Box 186
Bethel, VT 05032

May 27, 1998

Mr. Michael Amaral
Endangered Species Specialist
U.S. Fish & Wildlife Service
22 Bridge Street, Unit #1
Concord, NH 03301

RE: Threatened and Endangered Species at the North Hartland Lake Flood Control Project -
Hartland and Hartford, Vermont.

Dear Mr. Amaral:

On behalf of the U.S. Army Corps of Engineers, New England Division (USACOE/NED), ENSR requests information regarding the occurrence and distribution of federally listed threatened or endangered floral and faunal species, including any candidate species or critical habitats and/or natural communities within the USACOE North Hartland Lake Flood Control Project located along the Ottauquechee River in Windsor County, Vermont. This information is sought in support of a Master Plan that is being prepared for this area.

Enclosed for your use is a copy of the applicable USGS topographic map (Quechee, VT 1:25,000 scale quadrangle) with the areas of interest on the site highlighted. If available, lists by town (Hartland, and Hartford) or county (Windsor) of threatened, endangered, or candidate species would be useful as well.

If you have any questions, please do not hesitate to contact me at (978) 635-9500 extension 3528. Thank you in advance for your attention to this request.

Very truly yours,
ENSR

A handwritten signature in black ink, reading "David J. Cameron". The signature is fluid and cursive, with a long horizontal flourish extending to the right.

David J. Cameron
Sr. Ecologist & Wetlands Scientist

Attachment

cc: Elizabeth Powers, ENSR



United States Department of the Interior

FISH AND WILDLIFE SERVICE

New England Field Office
22 Bridge Street, Unit #1
Concord, New Hampshire 03301-4986

June 23, 1998

David J. Cameron
ENSR
35 Nagog Park
Acton, MA 01720

Dear Mr. Cameron:

This responds to your letter dated May 27, 1998, for information on the presence of federally-listed and proposed, endangered or threatened species in accordance with environmental planning for the U.S. Army Corps of Engineers North Hartland Lake Flood Control Project, Hartland and Hartford, Vermont.

Based on information currently available to us, no federally-listed or proposed, threatened and endangered species under the jurisdiction of the U.S. Fish and Wildlife Service are known to occur in the project area, with the exception of occasional, transient bald eagles (*Haliaeetus leucocephalus*) or peregrine falcons (*Falco peregrinus*). Inasmuch as distributional information on many rare species is incomplete or imprecise, it is not always possible to definitively rule out the possibility of rare species presence in a project area. This is particularly true for rare species of plants, insects and aquatic invertebrates.

We suggest that you contact Everett Marshall of the Vermont Natural Heritage Program, Agency of Natural Resources, 10 South, 103 So. Main Street, Waterbury, Vermont 05671-0501, at 802-241-3700, for information on state-listed species and rare natural communities that may be present.

Endangered dwarf wedgemussels (*Alasmodonta heterodon*) and endangered Jesup's milk-vetch (*Astragalus robbinsii* var. *jesupi*) occur downstream of the project area at Sumner Falls, Connecticut River.



State of Vermont

Department of Fish and Wildlife
Department of Forests, Parks and Recreation
Department of Environmental Conservation



AGENCY OF NATURAL RESOURCES

DEPARTMENT OF FISH AND WILDLIFE
103 South Main Street, 10 South
Waterbury, Vermont 05671-0501

Tel.: (802) 241-3700
TDD: 1-800-253-0191

Nongame & Natural Heritage Program

June 25, 1998

David J. Cameron
Sr. Ecologist & Wetland Specialist
ENSR
35 Nagog Park
Acton, MA 01720

Re: North Hartland Lake Flood Control Project
Hartford and Hartland, Vermont

Dear Mr. Cameron:

Everett Marshall asked that I respond to your request. I have enclosed a report of North Hartland Lake, and lists of rare, threatened and endangered species and natural communities for the towns of Hartford and Hartland.

Please contact me if you have any questions.

Sincerely,

Kristen Rose
Fish & Wildlife Technician
Tel: 802-241-3162
Email: krose@fwd.anr.state.vt.us

cc: Everett Marshall, Biologist/Data Manager

Uncommon and Rare Species,
and Natural Communities for the town of Hartland
Nongame and Natural Heritage Program
VT Department of Fish and Wildlife+
July 1, 1998

Scientific Name	Common Name	Global Rank	State Rank	State Status	Federal Status	Last Seen
Caprimulgus vociferus	Whip-poor-will	G5	S2S3B	SC		1995
Riverine floodplain forest			S3			1985
Riverside outcrop community			S3			1986
Rivershore grassland			S3			1984
Cicindela marginipennis	Cobblestone tiger beetle	G2G3	S1	T		1984
Alasmodonta heterodon	Dwarf wedgemussel	G1	S1	E	LE	1995
Cicindelid community						1986
Cirsium discolor	Field thistle	G5	S1S2			1932
Aster ptarmicoides	Snowy aster	G5	S2S3			1995
Hypericum ascyron	Great st. john's-wort	G4	S2	T		1993
Astragalus robbinsii var jesupii	Jesup's milk-vetch	G5T1	S1	E	LE	1995
Bartonia virginica	Yellow bartonia	G5	S1			1932
Gentiana quinquefolia	Stiff gentian	G5	S1	T		1912
Physostegia virginiana	Obedience	G5	S2	T		1995
Podostemum ceratophyllum	Riverweed	G5	S1			1982
Chimaphila maculata	Spotted wintergreen	G5	S2			1995
Ranunculus flabellaris	Yellow water-crowfoot	G5	S3			1922
Potentilla arguta	Tall cinquefoil	G5	S3			1881
Carex brevior	Sedge	G5?	S2S3			1995
Carex garberi	Garber's sedge	G4	S1	T		1985
Sisyrinchium mucronatum	Slender blue-eyed grass	G5	SH			1922
Allium schoenoprasum var sibiricum	Siberian chives	G5T5	S1			1994
Tofieldia glutinosa	Sticky false-asphodel	G5	S1	T		1984
Cypripedium calceolus var parviflorum	Small yellow lady's-slipper	G5	S3			1986
Cypripedium reginae	Showy lady's-slipper	G4	S3			1986
Malaxis brachypoda	White adder's mouth	G4Q	S2	T		1915
Dichanthelium xanthophysum	Yellow panic-grass	G5	S3			1891
Panicum tuckermanii	Tuckerman's panic-grass	G3G5	S1			1995

+ See enclosed Explanation of Ranks

Uncommon and Rare Species
and Natural Communities for the town of Hartford
Nongame and Natural Heritage Program
VT Department of Fish and Wildlife+
July 1, 1998

Scientific Name	Common Name	Global Rank	State Rank	State Status	Federal Status	Last Seen
Bufo fowleri	Woodhouse's toad	G5	S1	SC		1983
Ardea herodias	Great blue heron	G5	S2S3B,S5N			1995
Caprimulgus vociferus	Whip-poor-will	G5	S2S3B,SZN	SC		
Ammodramus savannarum	Grasshopper sparrow	G5	S1S2B,SZN	SC		1978
Rich fen		G3	S2			1994
Calcareous riverside seep community		G3	S1			1990
Boreal calcareous cliff community		G3	S2			1983
Cicindela marginipennis	Cobblestone tiger beetle	G2G3	S1	T		1995
Rhus aromatica	Fragrant sumac	G5	S3			1988
Panax quinquefolius	American ginseng	G4	S3			1990
Erigeron hyssopifolius	Hyssop-leaved fleabane	G5	S2			1995
Hypericum ascyron	Great st. john's-wort	G4	S2	T		1892
Corydalis aurea	Golden corydalis	G5	S2	T		1901
Gentianopsis crinita	Fringed gentian	G4	S3			1990
Collinsonia canadensis	Canada horse-balm	G5	S1			1938
Physostegia virginiana	Obedience	G5	S2	T		1991
Liriodendron tulipifera	Tulip tree	G5	SH			1942
Podostemum ceratophyllum	Riverweed	G5	S1			1982
Anemone multifida	Early thimbleweed	G5	S1	E		1980
Mimulus moschatus	Musk flower	G4G5	S2			1985
Carex argyrantha	Hay sedge	G5	S2			1995
Carex brevior	Sedge	G5?	S2S3			1995
Carex garberi	Garber's sedge	G4	S1	T		1920
Eleocharis pauciflora	Few-flowered spikerush	G5	S1	T		1987
Eriophorum gracile	Slender cotton-grass	G5	S1			1994
Rhynchospora capillacea	Capillary beak-rush	G5	S1	T		1875
Tofieldia glutinosa	Sticky false-asphodel	G5	S1	T		1990
Poa saltuensis	Drooping bluegrass	G5?	S2			1913
Woodsia alpina	Alpine woodsia	G5	S1	E		1910
Woodsia glabella	Smooth woodsia	G5	S2			1933

+ See enclosed Explanation of Rank

Vermont Nongame & Natural Heritage Program
Department of Fish and Wildlife
Explanation of Legal Status and Information Ranks

State Status As per the Vermont Endangered Species Law (10 V.S.A. Chap. 123)

- : Endangered: in immediate danger of becoming extirpated in the state
- : Threatened: with high possibility of becoming endangered in the near future

Information categories only; not established by this law

- C: Special Concern: rare; status should be watched
- PE: Proposed for endangered
- PT: Proposed for threatened

Federal Status As per the Federal Endangered Species Act (P.L. 93-205)

- LE: Listed endangered
- T: Listed threatened

NATURAL HERITAGE RANKING Informational categories only; not established by law.
Developed by the Science Division of The Nature Conservancy.

State Ranks of Plants, Animals, and Natural Communities

State ranks are assigned by the Nongame & Natural Heritage Program based on the best available information. Ranks are reviewed annually. For bird species the ranks refer to breeding status only.

- S1: Very rare, generally 1 to 5 occurrences believed to be extant and/or some factor(s) making it especially vulnerable to extirpation from the state
- S2: Rare, generally 6 to 20 occurrences believed to be extant and/or some factor(s) making it vulnerable to extirpation in the state
- S3: Uncommon, believed to be more than 20 occurrences and/or there is some threat to it in the state
- S4: Apparently secure in state, often with more than 100 occurrences
- S5: Demonstrably secure in state
- SA: Accidental in state
- SE: An exotic established in state
- SH: Known from historical records only
- SR: Reported from the state, but without persuasive documentation
- SRF: Reported in error but this error persisted in the literature
- SP: Possible in the state but no reported or documented records
- SSYN: No longer considered a taxon in the state.
- SZ: Not of practical conservation concern because there are no definable occurrences
- SX: Extirpated from the state
- SU: Status uncertain
- ?: Denotes provisional rank

Breeding Status (primarily birds) only for species which have distinct breeding and or nonbreeding populations

- B: Breeding status e.g. S1B is a very rare breeder
- N: Nonbreeding status e.g. S1N is a very rare nonbreeder; and SZN is a migrant that occurs in an irregular, transitory, and/or dispersed manner

Global Ranks of Plants, Animal, and Natural Communities

Global Ranks are assigned by the international network of Natural Heritage Data Centers. The ranks are tracked by The Nature Conservancy and by The Natural Heritage Programs. They reflect the rarity and endangerment of species worldwide.

- G1: Critically imperiled globally (on the order of 1-5 occurrences worldwide)
- G2: Endangered globally (ca. 6-20 occurrences worldwide)
- G3: Threatened globally: rare and/or local
- G4: Apparently secure globally, though perhaps locally rare
- G5: Demonstrably secure globally
- T: Subrank for subspecies and varieties; 1-5 ranking similar to G ranks
- Q: Questionable taxonomic assignment
- ?: Denotes provisional rank
- NE: Exotic established in nation
- GU: Status uncertain

For further information contact the Vermont Nongame and Natural Heritage Program, Dept. of Fish and Wildlife, Waterbury, VT 05671-0501



Upper Valley Lake Sunapee
Regional Planning Commission

Jeff O'Connell
ENSR Consulting & Engineering
95 State Road
Buzzards Bay, MA 02532

May 5, 1998

Jeff:

I am glad you called yesterday as a first step in collecting background information for the North Hartland Lake Master Plan. As we discussed, the Corps of Engineers property was the subject of a recent Public Lands Highways Study. The enclosed map shows you property lines with the Corps land shaded and the State land west of the Gorge in the speckled pattern. While the focus of much of the detailed planning in that project was on the Quechee Gorge end of the property, much of the inventory and mapping covered all of the Corps, State, and immediately surrounding private land. I am pleased to be able to share this with you rather than have efforts duplicated at public expense.

Please find enclosed the Quechee Gorge Public Lands Highways Study in 3 volumes. The Master Plan itself you can keep - we still have a few extras. The Study Area Inventory & Assessment and Supporting Studies, Surveys & Reports I would appreciate returned within 30 days

When I receive your zip disk I will send the GIS (PC Arc/Info) coverages we developed for that project along with any others I think may be of help to you that we have received or developed since that project. We have base layers from 1:5000 orthophotos, property lines, land use, wetlands, floodplains and deeryards for the whole area. We also have soils for Hartford and trails for the Gorge end of the site.

Please give me a call if you think of anything else I can do to help. Since the North Hartland Dam and the associated lands are a significant regional resource, we would appreciate the opportunity to receive draft plans as they become available for public comment and, if needed, to assist with facilitating the participation of Hartland and Hartford officials in the process.

Sincerely,

Tara E. Bamford
Tara E. Bamford
Senior Planner

cc: Mark Rosenthal, USACOE
UVLSRPC Commissioners - Hartford & Hartland



STATE OF VERMONT
AGENCY OF NATURAL RESOURCES
DEPARTMENT OF ENVIRONMENTAL
CONSERVATION

JEROME J. MCARDLE
WATER RESOURCES
ASSISTANT PLANNER

WATER QUALITY DIVISION
BUILDING 10 NORTH
WATERBURY VT 05671-0408

TEL.: (802) 241-3770
FAX: (802) 241-3287

Vermont Water Quality Standards

Adopted April 2, 1997
Effective April 21, 1997

Appendix B

Photographs

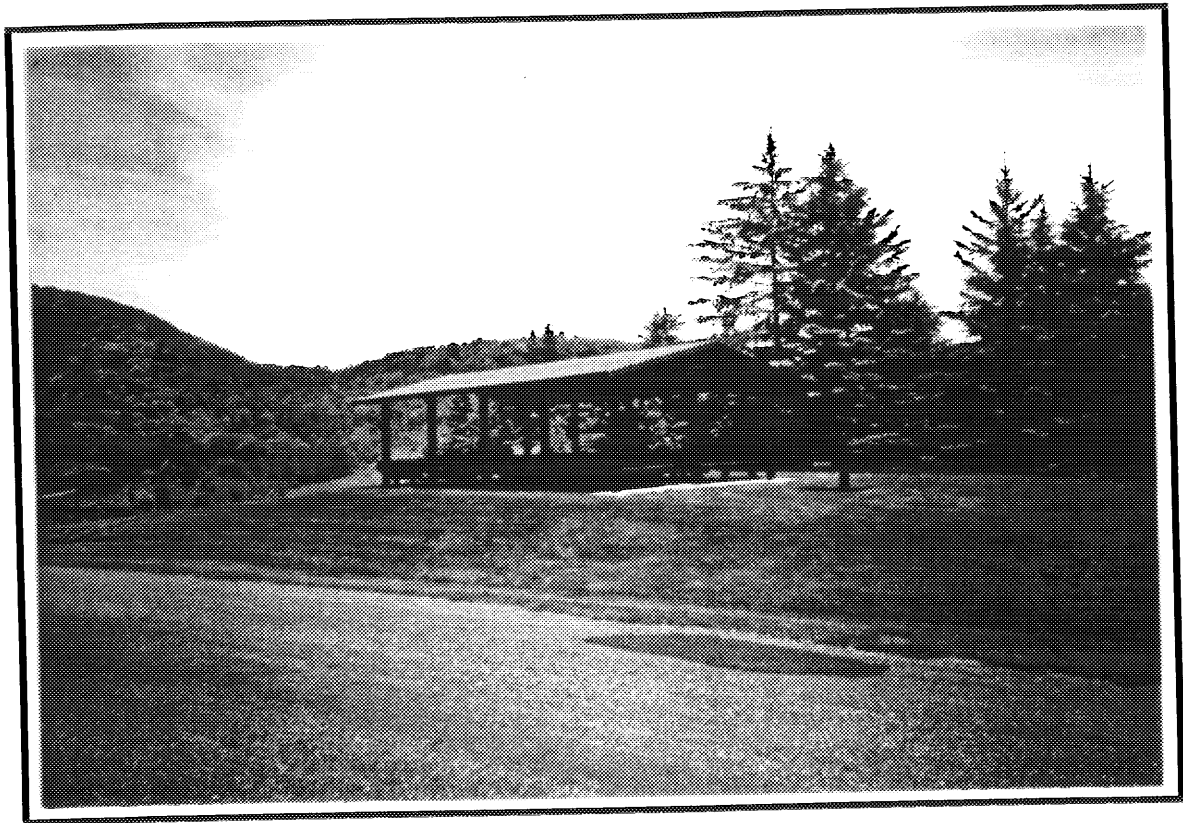


Photo 1: View of picnic shelter at North Hartland Lake.



Photo 2: View of North Hartland Lake access road and parking area.



Photo 3: View of public beach area at North Hartland Lake.

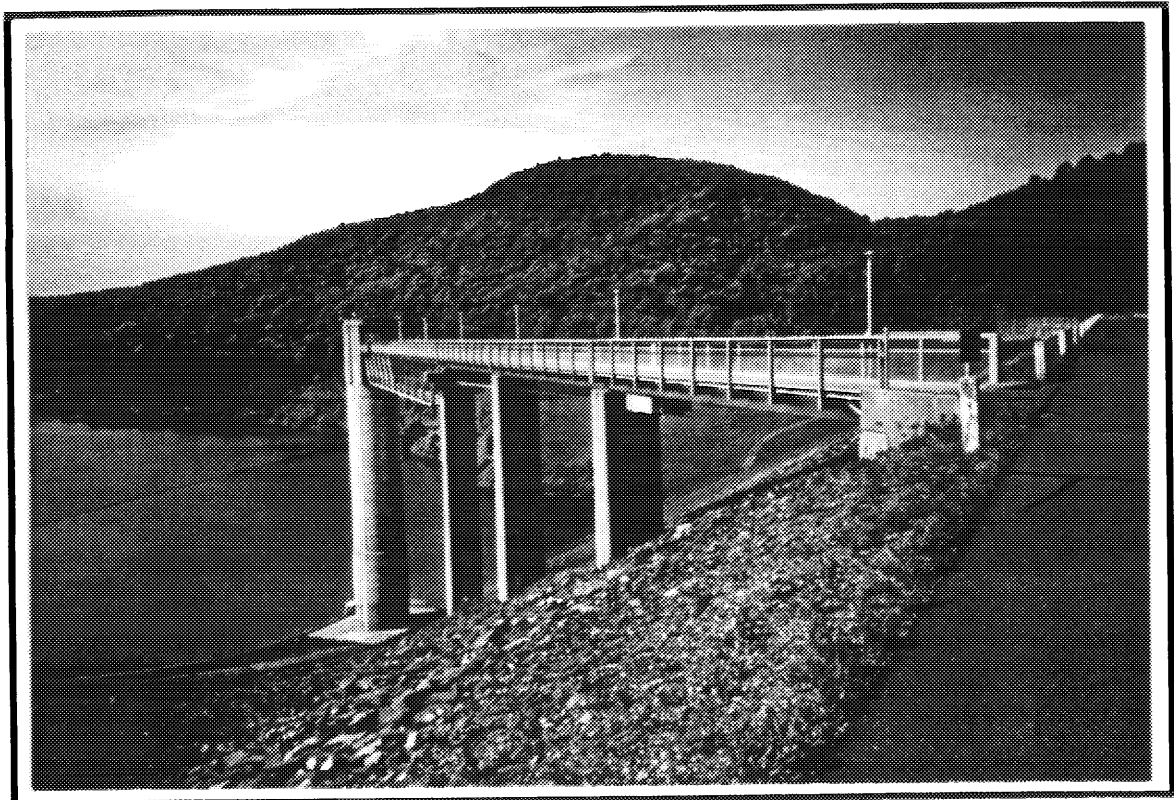


Photo 4: North Hartland Lake flood control dam and tower.

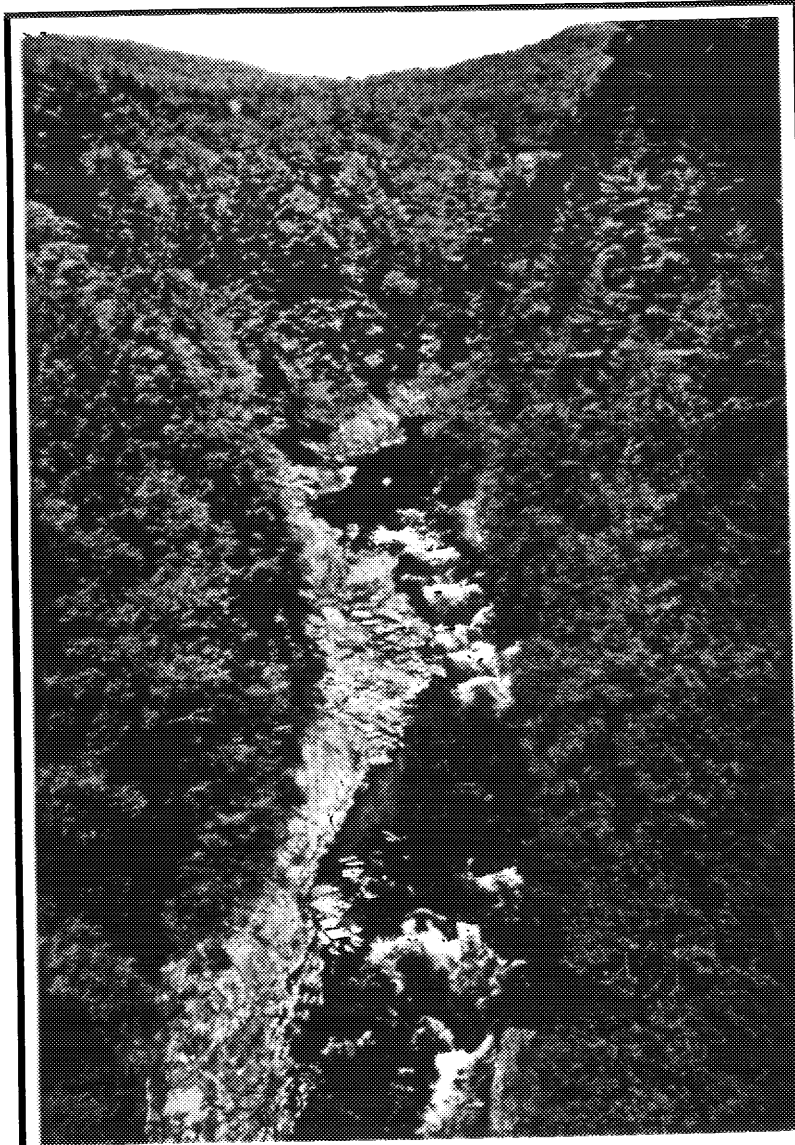


Photo 5: Northern view of
Quechee Gorge from
Route 4 bridge.

Photo 6: Quechee Gorge Trail
and erosion conditions.



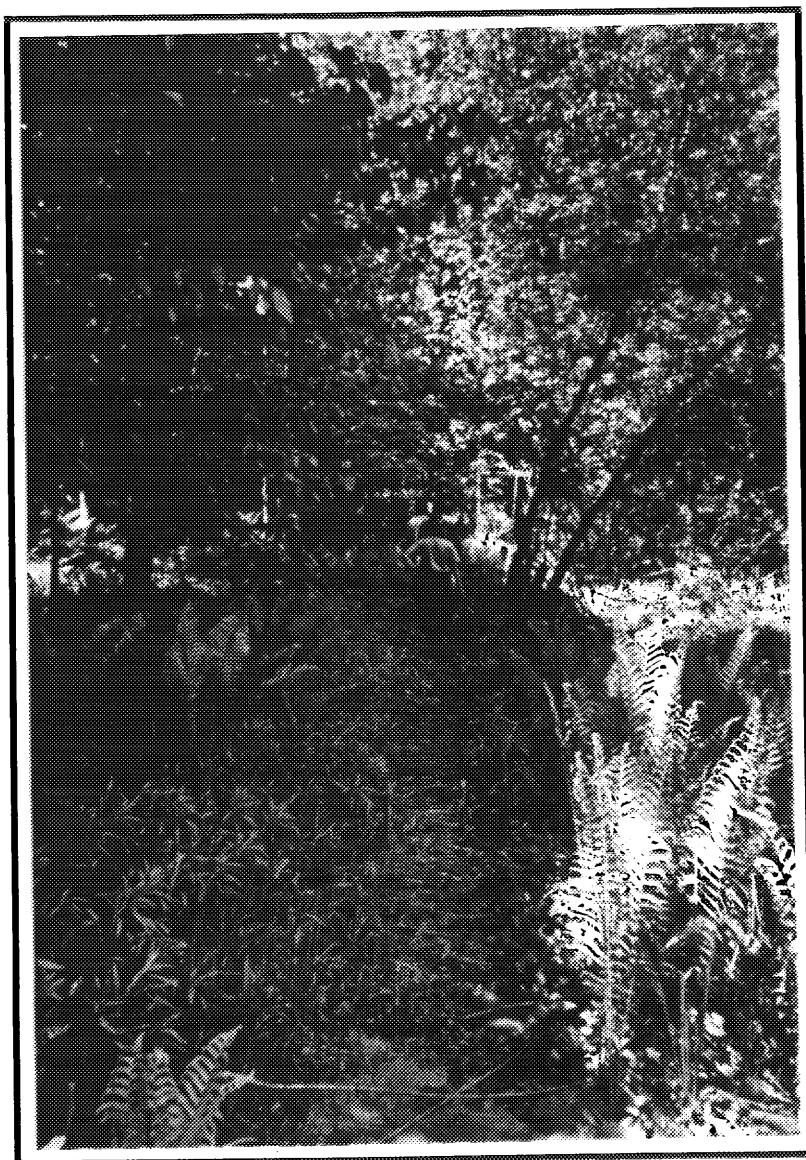


Photo 7: View of Quechee Gorge hiking trail (0.5 miles).



Photo 8: View of campsite at Quechee State Park.



Photo 9: Quechee State Park entrance off of State Route 4.



Photo 10: Hydroelectric facility operating near Dewey's Mill Pond.
North Hartland Lake

Appendix C
Expected Wildlife Species Tables
North Hartland Lake, Hartford and Hartland, Vermont

Appendix C-1
Expected Wildlife Species
North Hartland Lake, Hartford and Hartland, Vermont
Mammals

COMMON NAME	SCIENTIFIC NAME
Beaver	<i>Castor canadensis</i>
Big brown bat	<i>Eptesicus fuscus</i>
Black bear	<i>Ursus americanus</i>
Bobcat	<i>Felis rufus</i>
Coyote	<i>Canis latrans</i>
Deer mouse	<i>Peromyscus maniculatus</i>
Eastern chipmunk	<i>Tamias striatus</i>
Eastern cottontail	<i>Sylvilagus floridanus</i>
Ermine	<i>Mustela erminea</i>
Fisher	<i>Martes pennanti</i> ³
Gray fox	<i>Urocyon cinereoargenteus</i>
Gray squirrel	<i>Sciurus carolinensis</i>
Hairy-tailed mole	<i>Parascalops breweri</i>
House mouse	<i>Mus musculus</i>
Little brown myotis	<i>Myotis lucifugus</i>
Long-tailed weasel	<i>Mustela frenata</i>
Marten	<i>Martes americana</i> ³
Masked shrew	<i>Sorex cinereus</i>
Meadow jumping mouse	<i>Zapus hudsonius</i>
Meadow vole	<i>Microtus pennsylvanicus</i>
Mink	<i>Mustela vison</i>
Moose	<i>Alces alces</i>
Muskrat	<i>Ondatra zibethicus</i>
New England cottontail	<i>Sylvilagus transitionalis</i>
Northern flying squirrel	<i>Glaucomys sabrinus</i>
Northern short-tailed shrew	<i>Blarina brevicauda</i>
Porcupine	<i>Erethizon dorsatum</i>
Raccoon	<i>Procyon lotor</i>

Appendix C-1
Expected Wildlife Species
North Hartland Lake, Hartford and Hartland, Vermont
Mammals

COMMON NAME	SCIENTIFIC NAME
Red fox	<i>Vulpes vulpes</i>
Red squirrel	<i>Tamiasciurus hudsonicus</i>
Snowshoe hare	<i>Lepus americanus</i>
Southern red-backed vole	<i>Clethrionomys gapperi</i>
Striped skunk	<i>Mephitis mephitis</i>
Virginia opossum	<i>Didelphis virginiana</i>
White-footed mouse	<i>Peromyscus leucopus</i>
White-tailed deer	<i>Odocoileus virginianus</i>
Woodchuck	<i>Marmota monax</i>
Woodland jumping mouse	<i>Napaeozapus insignis</i>
Woodland vole	<i>Microtus pinetorum</i>

Status

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Appendix C-2
Expected Wildlife Species
North Hartland Lake, Hartford and Hartland, Vermont
Birds

COMMON NAME	SCIENTIFIC NAME
American crow	<i>Corvus brachyrhynchos</i>
American goldfinch	<i>Carduelis tristis</i>
American redstart	<i>Setophaga ruticilla</i>
American robin	<i>Turdus migratorius</i>
American tree sparrow	<i>Spizella arborea</i>
Barred owl	<i>Strix varia</i>
Belted kingfisher	<i>Ceryle alcyon</i>
Black-and-white warbler	<i>Mniotilta varia</i>
Blackburnian warbler	<i>Dendroica fusca</i>
Black-capped chickadee	<i>Parus atricapillus</i>
Black-throated blue warbler	<i>Dendroica caerulescens</i>
Black-throated green warbler	<i>Dendroica virens</i>
Blue jay	<i>Cyanocitta cristata</i>
Bobolink	<i>Dolichonyx oryzivorus</i>
Broad-winged hawk	<i>Buteo platypterus</i>
Brown-headed cowbird	<i>Molothrus ater</i>
Canada goose	<i>Branta canadensis</i>
Canada warbler	<i>Wilsonia canadensis</i>
Chestnut-sided warbler	<i>Dendroica pensylvanica</i>
Chipping sparrow	<i>Spizella passerina</i>
Common raven	<i>Corvus corax</i>
Common yellowthroat	<i>Geothlypis trichas</i>
Dark-eyed junco	<i>Junco hyemalis</i>
Downy woodpecker	<i>Picoides pubescens</i>
Eastern bluebird	<i>Sialia sialis</i>
Eastern kingbird	<i>Tyrannus tyrannus</i>
Eastern phoebe	<i>Sayornis phoebe</i>
Eastern wood-pewee	<i>Contopus virens</i>

Appendix C-2
Expected Wildlife Species
North Hartland Lake, Hartford and Hartland, Vermont
Birds

COMMON NAME	SCIENTIFIC NAME
Evening grosbeak	<i>Coccothraustes vespertinus</i>
Golden-crowned kinglet	<i>Regulus satrapa</i>
Gray catbird	<i>Dumetella carolinensis</i>
Great blue heron	<i>Ardea herodias</i> ³
Great crested flycatcher	<i>Myiarchus crinitus</i>
Great horned owl	<i>Bubo virginianus</i>
Green-backed heron	<i>Butorides striatus</i>
Hairy woodpecker	<i>Picoides villosus</i>
House finch	<i>Carpodacus mexicanus</i>
Killdeer	<i>Charadrius vociferus</i>
Least flycatcher	<i>Empidonax minimus</i>
Magnolia warbler	<i>Dendroica magnolia</i>
Mallard	<i>Anas platyrhynchos</i>
Mourning dove	<i>Zenaida macroura</i>
Northern cardinal	<i>Cardinalis cardinalis</i>
Northern flicker	<i>Colaptes auratus</i>
Northern oriole	<i>Icterus galbula</i>
Ovenbird	<i>Seiurus aurocapillus</i>
Purple finch	<i>Carpodacus purpureus</i>
Red-breasted nuthatch	<i>Sitta canadensis</i>
Red-eyed vireo	<i>Vireo olivaceus</i>
Red-tailed hawk	<i>Buteo jamaicensis</i>
Red-winged blackbird	<i>Agelaius phoeniceus</i>
Rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>
Ruffed grouse	<i>Bonasa umbellus</i>
Rufous-sided towhee	<i>Pipilo erythrophthalmus</i>
Scarlet tanager	<i>Piranga olivacea</i>
Sharp-shinned hawk	<i>Accipiter striatus</i> ³

Appendix C-2
Expected Wildlife Species
North Hartland Lake, Hartford and Hartland, Vermont
Birds

COMMON NAME	SCIENTIFIC NAME
Solitary vireo	<i>Vireo solitarius</i>
Song sparrow	<i>Melospiza melodia</i>
Spotted sandpiper	<i>Actitis macularia</i>
Tree swallow	<i>Tachycineta bicolor</i>
Tufted titmouse	<i>Parus bicolor</i>
Veery	<i>Catharus fuscescens</i>
White-breasted nuthatch	<i>Sitta carolinensis</i>
White-throated sparrow	<i>Zonotrichia albicollis</i>
Winter wren	<i>Troglodytes troglodytes</i>
Wood duck	<i>Aix sponsa</i>
Wood thrush	<i>Hylocichla mustelina</i>
Yellow warbler	<i>Dendroica petechia</i>
Yellow-rumped warbler	<i>Dendroica coronata</i>

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Appendix C-3
Expected Wildlife Species
Amphibians

COMMON NAME	SCIENTIFIC NAME
Bullfrog	<i>Rana catesbeiana</i>
Common snapping turtle	<i>Chelydra s. serpentina</i>
Eastern American toad	<i>Bufo a. americanus</i>
Eastern garter snake	<i>Thamnophis s. sirtalis</i>
Eastern milk snake	<i>Lampropeltis t. triangulum</i>
Eastern painted turtle	<i>Chrysemys p. picta</i>
Eastern smooth green snake	<i>Opheodrys v. vernalis</i>
Gray treefrog	<i>Hyla versicolor</i>
Green frog	<i>Rana clamitans melanota</i>
Jefferson salamander	<i>Ambystoma jeffersonianum</i> ³
Northern black racer	<i>Coluber c. constrictor</i>
Northern brown snake	<i>Storeria d. dekayi</i>
Northern dusky salamander	<i>Desmognathus f. fuscus</i>
Northern redbelly snake	<i>Storeria o. occipitomaculata</i>
Northern ribbon snake	<i>Thamnophis sauritus septentrionalis</i>
Northern ringneck snake	<i>Diadophis punctatus edwardsi</i>
Northern spring peeper	<i>Hyla c. crucifer</i>
Northern spring salamander	<i>Gyrinophilus p. porphyriticus</i>
Northern two-lined salamander	<i>Eurycea b. bislineata</i>
Northern water snake	<i>Nerodia s. sipedon</i>
Pickerel frog	<i>Rana palustris</i>
Red-spotted newt	<i>Notophthalmus v. viridescens</i>
Redback salamander	<i>Plethodon cinereus</i>
Spotted salamander	<i>Ambystoma maculatum</i>
Stinkpot	<i>Sternotherus odoratus</i>

Appendix C-3
Expected Wildlife Species
Amphibians

COMMON NAME	SCIENTIFIC NAME
Wood frog	<i>Rana sylvatica</i>
Wood turtle	<i>Clemmys insculpta</i>

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Appendix D
North Hartland Lake
Suitability Characteristics for Prevalent Soil Types

Appendix D-1
Woodlot Management and Productivity Suitability
For Prevalent Soil Types at North Hartland Lake

SOIL NAME (and Map Symbol)	Management Concerns					Potential Productivity
	Erosion Hazard	Equipment Limitation	Seeding Mortality	Windthrow Hazard	Plant Competition	Suggested Trees to Plant
Glover-Vershire (20)	Slight to Severe	Slight to Severe	Slight	Moderate	Moderate	Eastern White Pine, Red Spruce, White Spruce
Hitchcock (1)	Slight to Severe	Slight to Severe	Slight to Moderate	Slight	Moderate	Norway Spruce, Eastern White Pine, Red Pine, White Spruce
Lyman (42)	Moderate	Moderate	Moderate	Severe	Moderate	Balsam Fir, Eastern White Pine, Red Pine, White Spruce
Markey- Wonsqueak (47)	Slight	Severe	Severe	Severe	Severe	N/A
Ondawa (23)	Slight	Slight	Severe	Slight	Slight	Eastern White Pine, Red Pine, White Spruce
Windsor (5)	Slight to Severe	Slight to Severe	Severe	Slight	Slight	Norway Spruce, Eastern White Pine, Red Pine

Appendix D-2
Wildlife Habitat Suitability
For Prevalent Soil Types at North Hartland Lake

SOIL NAME (and Map Symbol)	Potential for Habitat Elements							Potential Habitat for:		
	Grain and Seed Caps	Grasses and Legumes	Wild Herbaceous Plants	Hardwood Trees	Coniferous Plants	Wetland Plants	Shallow Water Areas	Open-Land Wildlife	Woodland Wildlife	Wetland Wildlife
Glover- Vershire (20)	Poor to Very Poor	Fair to Very Poor	Fair	Good	Good	Very Poor	Very Poor	Poor to Fair	Fair to Good	Very Poor
Hitchcock (1)	Fair to Very Poor	Poor to Good	Good	Good	Good	Poor to Very Poor	Very Poor	Poor to Good	Good	Very Poor
Lyman (42)	Very Poor	Poor	Fair	Poor	Poor	Very Poor	Very Poor	Poor	Poor	Very Poor
Markey- Wonsqueak (47)	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
Ondawa (23)	Poor	Fair	Fair	Good	Good	Poor	Very Poor	Fair	Good	Very Poor
Windsor (5)	Poor to Very Poor	Poor	Fair	Poor	Poor	Very Poor	Very Poor	Poor	Poor	Very Poor

Appendix D-3
Recreation Development Suitability
For Prevalent Soil Types at North Hartland Lake

SOIL NAME (and Map Symbol)	Camp Areas	Picnic Areas	Playgrounds	Paths and Trails	Golf Fairways
Glover-Vershire (20)	Moderate to Severe	Moderate to Severe	Severe	Slight to Severe	Moderate to Severe
Hitchcock (1)	Moderate to Severe	Moderate to Severe	Moderate to Severe	Severe	Slight to Severe
Lyman (42)	Severe	Severe	Severe	Severe	Severe
Markey-Wonsqueak (47)	Severe	Severe	Severe	Severe	Severe
Ondawa (23)	Severe	Moderate	Severe	Moderate	Severe
Windsor (5)	Moderate to Severe	Moderate to Severe	Moderate to Severe	Moderate to Severe	Moderate to Severe

Appendix D-4
Building Development Suitability
For Prevalent Soil Types at North Hartland Lake

Soil Name (and Map Symbol)	Shallow Excavations	Dwellings Without Basement	Dwellings with Basements	Small Commercial Buildings	Local Roads and Streets	Lawns and Landscaping
Glover-Vershire (20)	Severe	Moderate to Severe	Severe	Severe	Moderate to Severe	Moderate to Severe
Hitchcock (1)	Slight to Severe	Slight to Severe	Slight to Severe	Moderate to Severe	Severe	Slight to Severe
Lyman (42)	Severe	Severe	Severe	Severe	Severe	Severe
Markey-Wonsqueak (47)	Severe	Severe	Severe	Severe	Severe	Severe
Ondawa (23)	Severe	Severe	Severe	Severe	Severe	Severe
Windsor (5)	Severe	Slight to Severe	Slight to Severe	Moderate to Severe	Slight to Severe	Moderate to Severe